ELECTRICAL REVIEW

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25th June, 1948

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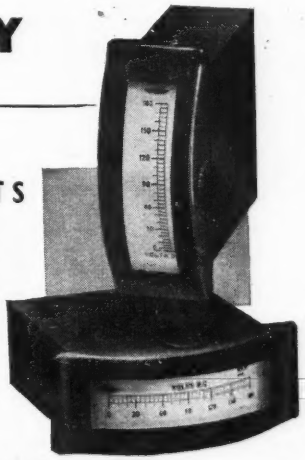

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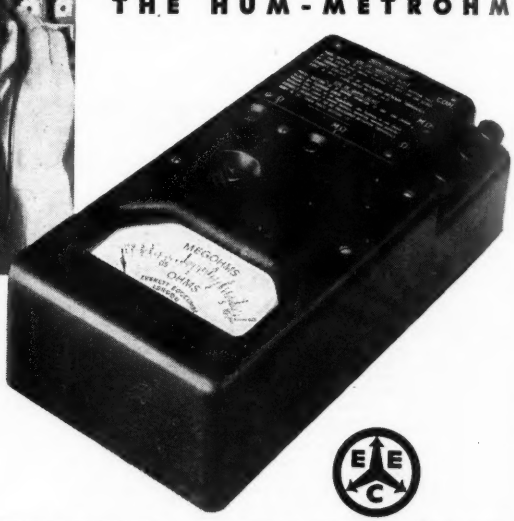

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLII. No. 3683 25th JUNE, 1948 9d. WEEKLY

International Electricity

Significance of the Paris Conference

WHILE concern is often expressed about a possible insufficiency of world power resources at some time in the future, less attention is given to the earlier date at which the resources that are available might be sterilized through inability to bring the power in the form of electricity to users. Distances of transmission tend to lengthen with accompanying troubles with system stability and this brings to light problems (especially at voltages much higher than any now in use) that are as yet incompletely solved and take those engaged in investigating them in different countries about as far as thought can reach. The growing magnitude of consumers' demands has helped to make transmission questions even more complex than those relating to generation.

Diversity of Subjects

Each new development opens up new aspects that invite diverse proposals for treatment which, though local in origin, may be profitably adapted to conditions elsewhere. In that lies the particular value at this stage of the International Conference on Large Electric Systems (C.I.G.R.E.), which opened in Paris yesterday. A strong British delegation is attending and is responsible for eleven of the 117 papers to be discussed. The subjects they have chosen provide good illustrations of the live matters dealt with by the Conference, and include such items as the mechanical design of 264-kV lines, air-blast breakers, porcelain insulators, neutral earthing, lightning effects, interference with communications, harmonics in a.c. networks, system stability, calculations for long-distance lines, corona and d.c. transmission. Study of advance copies shows that the authors worthily sustain the reputation of this country, which will not be allowed to rest upon the laurels gained by such pioneers as Parsons, Ferranti and Merz whose work laid the foundations of public electricity supply.

Testing at 500 kV

A good proportion of the papers submitted deal with aspects of transmission that have not yet found their way into common practice. Under the pressure of circumstances, however, developments may be more rapid than would have seemed likely only a little while ago. The 500-kV testing station at Chevilly near Paris is as significant in this connection as it will be interesting to the C.I.G.R.E. members who are to visit it.

Transmission problems of the most immediate urgency are probably those relating to the " international programme " drawn up by Committee of European Economic Co-operation under the Marshall plan. The Technical Committee responsible for electrical matters finds that the aggregate growth of demand of 22 million kW by 1951 could not be met by individual national programmes of generating plant construction. In boldly proposing that the serious deficiency of 2·3 million kW should be made up by building hydro, lignite and geo-thermic power stations just where they can be most economically located and expeditiously set to work with a view to

transmitting their output to areas where electricity is most surely needed, the Technical Committee took the commonsense course of ignoring national frontiers. Engineers in carrying out their normal duties thus not only contribute to European recovery but also set an example of international co-operation that may have far reaching effects. This spirit of understanding among engineers of different lands undoubtedly owes much to meetings such as those arranged by C.I.G.R.E. in Paris and the World Power Conference, the "large dams" section of which was at Stockholm last week.

Engineering Wages

By an uncomfortably narrow majority the annual conference of the Amalgamated Engineering Union decided last week not to declare in favour of a national strike to enforce the Union's claim for increased wages. Such action at the present time would have a disastrous effect upon the nation's economy and would particularly hit export trade of which machinery forms an important and expanding proportion. Mr. J. Tanner, the A.E.U. president, threw his weight against the immediate strike proposal. The Government is to be asked to arrange an inquiry into wages in the engineering industry and if the inquiring Commission's findings are unacceptable there will be a strike ballot.

Incentive Bonuses

The Coventry electrical section of the Transport and General Workers' Union has asked the Union's Executive Council to press for a scheme of "incentive bonuses" for electricity supply employees, based on the efficiency of the undertakings. A district organizer said that it was an obligation on workers in the industry to see that nationalization worked efficiently. That might be considered a sufficient incentive but if monetary reward is the aim the question arises: How is efficiency to be measured? In the power station efficiency is recorded in thermal terms but very few of the men engaged in the industry can be said to contribute to this efficiency. Outside the station, transmission efficiency may be expressed in less exact figures but beyond that point the measurement can be only of a financial character. Is profit sharing the aim? If so how is this to be operated on a local basis in a national and regional organization?

American Price Policy

Earlier this year the two leading American electrical manufacturing concerns — Westinghouse and General Electric—announced their intention, as an anti-inflationary measure, to reduce prices of a number of their products and reject claims for higher wages. Since then external circumstances have proved too strong to permit adherence to this policy and it is now reported that both companies have had to accede to demands for increased wages and in consequence prices are going up again. This proves how difficult it is for any one branch of industry to attempt stabilization in the absence of a firm national policy on wages and prices.

Tomato Growing

Useful advice is given in a new E.R.A. Technical Report (W/T.15 18s. net) to those who follow the increasingly popular activity, whether professional or amateur, of cultivating tomatoes under glass. The authors, C. A. Cameron Brown and E. W. Golding, show "Electrical Pre-Warming of Tomato-House Soil" before planting out in early spring to be economical as well as effective. They also make suggestions for improving economy during the growing period and for design of installations. For the best pre-planting out conditions the soil temperature is raised to between 57 and 60 deg F for 24 hours for a consumption of about 0·15 kWh per sq ft. This is done by loading a galvanized iron grid, buried 12 to 15 ft, at 5 W per sq ft through a 30-V transformer.

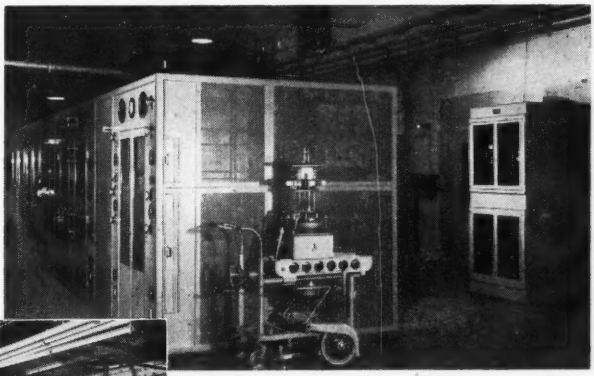
Electro-Mechanical Supervisors

At the recent annual conference of the Association of Supervising Electrical Engineers a motion was put forward aiming at the extension of membership to other than electrical supervising engineers "provided they were of equal status." An amendment was adopted instructing the Executive Council to prepare a memorandum on the subject for submission to the membership. Many supervising engineers whose duties are mainly on the mechanical side have the care of electrical plant and so the development would be a logical one.

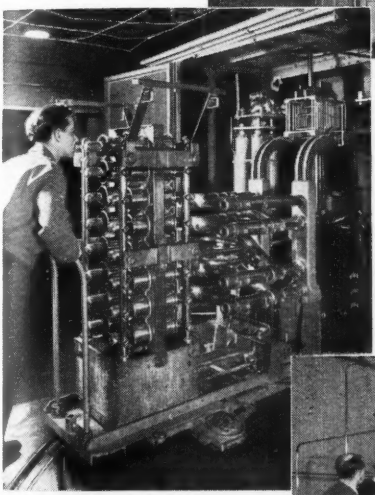
Large Broadcasting Station

Twelve Transmitters with Fifty-one Aerial Arrays

THE short-wave radio-broadcasting station at Skelton in North Cumberland is one of the most powerful in the world. It consists of two separate parts operated as a single unit, so that when all the transmitters are functioning at the same time, 1,500 kW is delivered to the aerial arrays, the direction of their radiation and frequencies being changed as required for day and night service in thirty-six languages to all



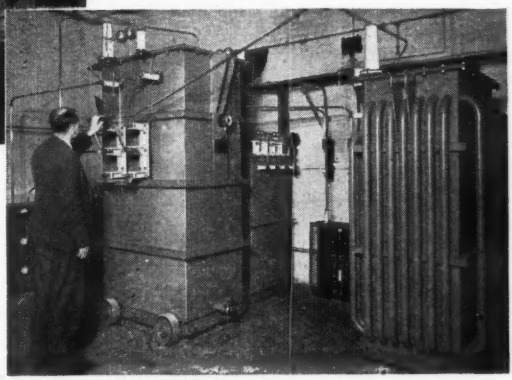
One of the 100-kW transmitters showing valve-replacement trolley and filament voltage control cubicle at rear

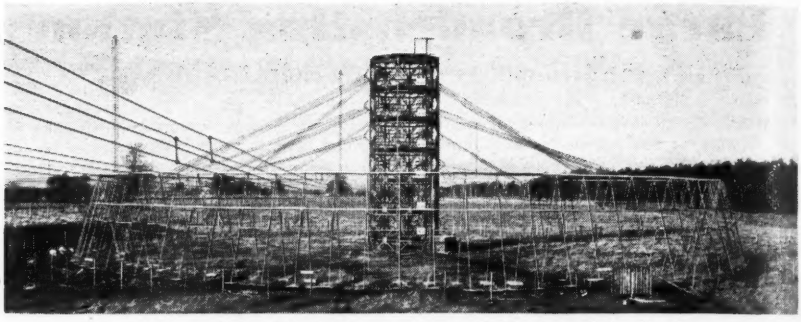


Tuning inductances for wave changing on rail-guided trucks. *Right:* Massive audio-frequency components, push-pull transformer with modulation choke behind and high-voltage transformer on right

Europe, North and South America and ships sailing the Pacific Ocean. The last-mentioned circuit of 14,000 miles, represents the longest direct transmission achieved consistent with good reception; a 100-kW channel, or the full output of one transmitter, is needed.

The plant was constructed specifically for that purpose by the British Broadcasting Corporation during the war (though not hitherto described) and commenced operating in 1943 with sufficient power to be heard in all parts of Europe, notwithstanding enemy interference. It is situated between Penrith and Carlisle, 600 ft above sea level, in a depression between the Pennine Hills and



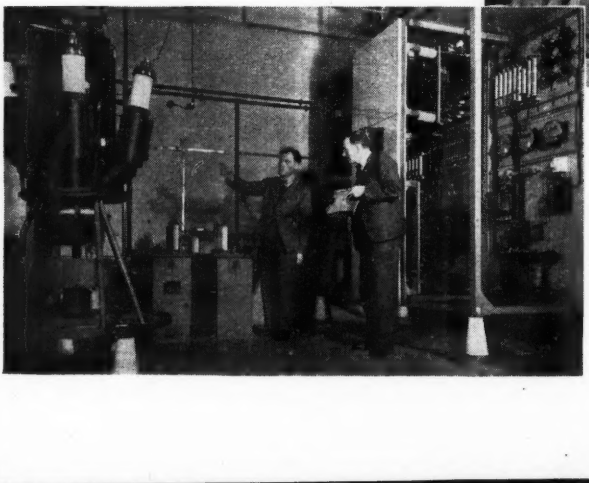


Remotely controlled aerial-switching tower surrounded by transmission line frame

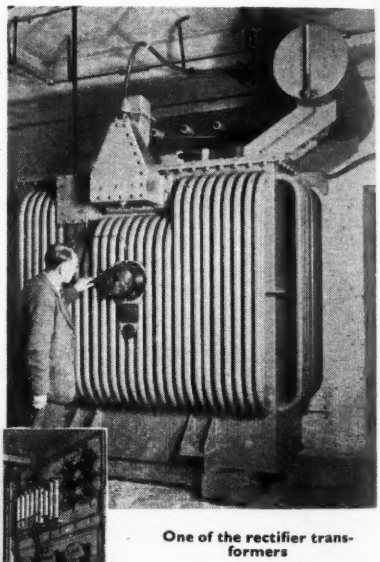
the Cumberland Fells. The two sets of station buildings are at the extremities of an oval periphery of 4½ miles, 1½ miles long, enclosing 750 acres. Fifty-one aerial arrays are supported by thirty-one masts, varying from 200 to 350 ft in height. The squat buildings are of reinforced-concrete design to afford protection against attack from the air. Therefore the six transmitters in each building are enclosed, in pairs, in three separate rooms with concrete walls separating them from their auxiliaries.

Almost every electrical item in the section designated station OSE.8 was designed, constructed and installed by what is now the "English Electric" group of companies. Each of the six 100-kW Marconi transmitters is made up of metal cabinets standing side by side, presenting a uniform front of glass-panelled inspection doors with meters above them. This series is nearly 7 ft in height and over 30 ft long. The pair in each hall face one another; between them, side by side, but facing opposite directions, are their respective control engineers' cubicles.

Below : **Rectifier and control gear on 12-kV insulators**



Amplification in successive cabinets proceeds from opposite ends, combining at the middle, where the incoming audio-frequency "signals" are impressed upon (modulate) the high-frequency carrier outgoing to the aerials. This is done by passing the final

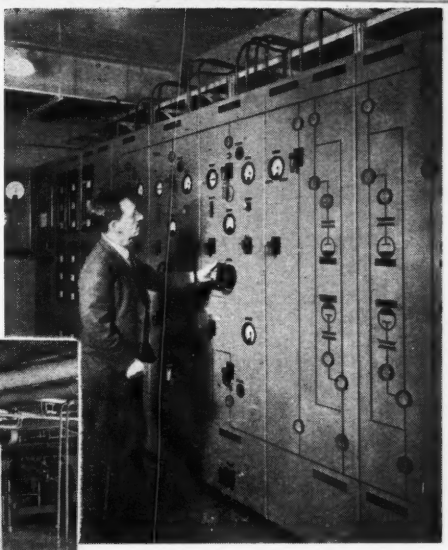


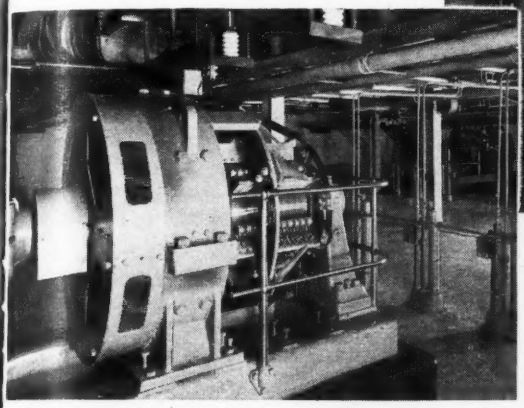
One of the rectifier transformers

output of the main modulator to a push-pull transformer of special design, the audio-frequency voltage developed across its secondary winding being used to vary the anode voltage amplitude

of the final high-frequency amplifier stage.

The primary of this transformer carries up to 20 A at over 7,000 V while its secondary delivers 14 A at 10,500 V, all peak values. The associated modulation choke which isolates the audio-voltages from the d.c. has an inductance of 13 henrys at 14 A. These figures become impressive upon reflection that 1 mW at the main input terminals of the transmitter will cause the carrier to be modulated 100 per cent, representing





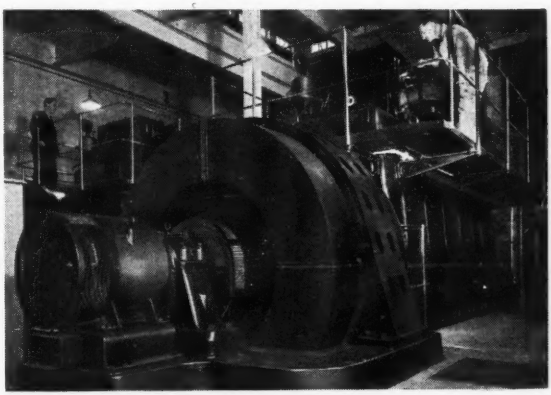
Mimic-diagram power house control board. *Left*: **Motor-generator in basement for valve filament heating**

a 72 million to one power magnification.

The inductances associated with the condensers for tuning amplifier anodes are mounted on trucks which are run on castors along guide rails in the floor. They can thus be easily wheeled in and out for frequency changing. By reducing the length of permanent connectors in this way, stray capacity and inductance are minimized, so improving stability.

The larger valves, which are 3 ft 6 in. high, are moved upright in wheeled trolleys for rapid replacement. Each filament needs 460 A at 32 V and each anode dissipates 25 kW at 10,500 V, though capable of 150 kW at 20,000 V; anode peaks reach 70 A with 100 per cent modulation, the rated emission of each value being 100 A. The water used for cooling the anodes is pumped in a closed circuit through an interchange cooler, so transferring heat to a secondary system circulating in wall pipes to heat the building.

Transmissions are "beamed" to different parts of the world with the aid of aerial-switching towers, 40 ft high. There are six levels, each having a switching arm connected to one of six transmitters and rotating over seven sets of fixed contacts round the



One of the 500-kW diesel-generators with exciter on shaft extension

tower periphery which are, in turn, connected to feeders going to differently oriented aerial arrays. The switching arms are motor driven and separately actuated from the control desk in the distant transmitter house. On that desk are switches, with meters, pilot lamps and indicating relays, for centrally controlling auxiliary machines and plant, all provided with electrical and mechanical interlocks and safety trips.

Valve anodes derive d.c. from mercury vapour rectifiers of the air-cooled pumpless steel-tank type. There is one set for each of the OSE.8 transmitters, rated at 500 kW at from 10 to 13 kV, variable in seven steps of 500 V by off-load tapping the 11-kV input transformer. Fine adjustment between tappings is by grid control through a phase-shifting induction regulator driven by a small d.c. pilot motor operated by push buttons from the central control desk.

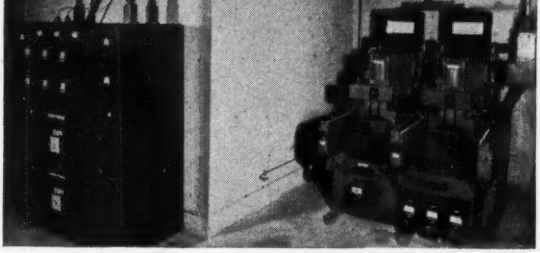
Oil switchgear and isolators in 11-kV substation

The negative side of the d.c. system is earthed through the anode cooling water jackets; thus the rectifier and all its auxiliaries are about 12 kV above earth potential. Therefore the whole equipment stands on porcelain insulators and the low-voltage auxiliary supply to the control gear is obtained through an insulating transformer of one-to-one ratio. Indicating instruments are viewed through a glass window in the front screen of the concrete cubicle. A relay has been specially designed to block the rectifier grids within 0·014 second in the event of either the a.c. or d.c. rising beyond pre-determined values, or their rates of rise becoming excessive.

Associated with this relay is equipment that will suppress the rectifier voltage in the event of a transmitter flashover or rectifier backfire for a period which is long enough to allow the fault path to deionise; d.c. is then gradually restored to the anodes of the transmitter valves. This automatic blocking and reinstatement of voltage occupies a period which can be varied from 1·5 to 5 seconds. It can be repeated a predetermined number of times within a given period after which, if the fault persists, the input oil circuit breaker of the rectifier is tripped.

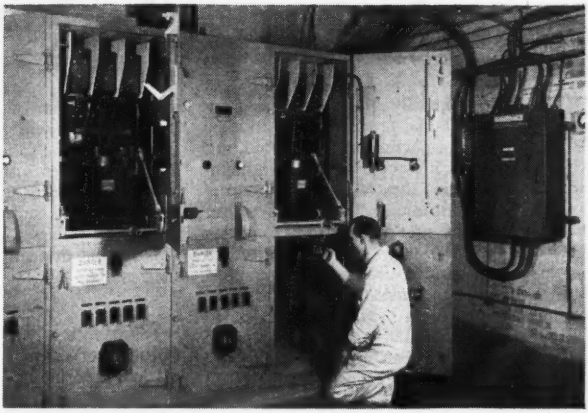
The filaments of valves in the early h.f. stages are heated with a.c. whereas those in the lower stages are served by an auxiliary rectifier in the basement. For the filaments of the main valves there are massive motor-generator sets in the basement. Each transmitter is served by one generator of 1,000 to 2,000 A at from 2 to 35 V, driven by a 112·5-h.p., 585 r.p.m., three-phase, squirrel cage, contactor started motor. Generator excitation current is furnished by a small glass-bulb rectifier in the basement and regulated by motor driven rheostats.

General power for the combined site is derived from three sources. Part of it is purchased externally and de-



Oil circuit breakers with control and metering panel for 11-kV incoming feeders

livered by direct feeder at 11 kV 50 c/s three-phase to one intake at each building. There are thus two sub-stations and two internal power houses, all four interconnected.



Air-break 400-V switch panels in distribution chamber

The OSE.8 power house contains three 6.L-type vertical 750-b.h.p. diesel engines coupled to three-phase 11-kV, 555-kVA, 375-r.p.m. alternators, with separate exciters on their shafts. An automatic field-suppression cubicle is provided.

The engines are started with compressed air and can be on load in about two minutes. Fuel oil is stored in underground tanks. Engine circulating water is cooled by radiators, one for each, with a chimney-like erection above it to promote natural draught.

The vertical control board is of the flush panel type, of mimic diagram form with coloured pilot lamps indicating the positions of isolators and oil circuit breakers. The latter are of the OLD-type for the incoming feeders and of the OLB-type for the generators and distributors. Metering facilities are provided for the generators and principal circuits. Regulation of generator voltage is on the thyratron principle. Three-element (two overload and one earth-leakage) and reverse power relays are provided.

Internal distribution is three-phase at 11 kV and 415 V, the latter through OB-type air-break switch panels in a chamber above the main control room in each power house, whence lead-covered cables supported on racks radiate to local CFS-type fuse-switchgear.

Provision for circuit change-over is unusually complete and duplication of low-voltage sources is effected through 1,250 kVA step-down transformers, one at each power house and another at each substation. They have Buchholz relays and Merz-Price circulating current protection between the high- and low-voltage sides as well as automatic methyl-bromide fire extinguishing gear, which is extended into the 11-kV switchgear compartments. There is a three-phase a.c. moving coil regulator for certain constant-voltage circuits and a glass bulb rectifier for charging a 240-V battery for tripping, indicating and control purposes.

The twin station at the other end of the site, known as OSE.9, is very similar in general layout and capacity, except that the six radio transmitters were made by Standard Telephones & Cables, Ltd., the three diesel engines by Mirrlees, Bickerton & Day, Ltd., and the alternators and power switchgear by the British Thomson-Houston Co., Ltd.

The normal load factor of the combined stations is about 75 per cent and, at slightly reduced power, their combined maximum demand is 5,400 kW. The diesel-alternators were originally intended for standby purposes, but they have latterly been run regularly for "lopping" the peak off purchased power. Thus, by running all three sets at nearly full load for some four hours, the OSE.8 station generators alone have averaged 20,430 kWh per day, the single station maximum demand totalling 2,500 kW before programme reductions reduced it to 1,300 kW, thus bringing it again within the capacity of the three sets.

During the past five years, broadcasting for 22 hours a day, the average shut-down time of the power plant has been less than 0·04 per cent, which is a record of which the plant operators and manufacturers may well be proud.

Acknowledgment is due to the B.B.C. and to Mr. S. A. Williams, engineer-in-charge at Skelton, for facilitating the preparation of this article and providing some of the photographs.

Views on the News

Reflections on Current Topics

THE most carefully planned lighting installation can be rendered ineffective by its surroundings—particularly their colour. Again, colour is now realized to be an important factor in the relief of industrial fatigue and monotony. Light and colour thus go together and explain the Lighting Service Bureau's interest in the subject of chromatics in industry, as it is termed. I find Technical Supplement No. 3 produced by the Bureau a very useful introduction to the subject as it explains quite simply the nature of human vision and of colour and their interaction, and demonstrates the effect upon colours of different forms of illuminant. Suggestions are made for the selection of colours appropriate to various situations and processes. The illustrations, are good, particularly one showing the use of colour on a machine tool. I commend the booklet to all who are practically interested. It is obtainable gratis from the Bureau, 2, Savoy Hill, W.C.2, but only those who really need it should ask for it as the quantity is limited.

* * *

Probably more often than not the Ward Leonard system of control is hyphenated. This has worried one of my correspondents who decided to straighten the matter out. He therefore wrote to the Ward Leonard Co. in Chicago and was told by them that the business was founded by Mr. H. Ward Leonard (Ward being a "given" name). Thus the hyphen has no justification and I, for one, will be careful not to use it in the future.

* * *

As the customers of the British Broadcasting Corporation are the principal sufferers from the stray electro-magnetic waves from electrical apparatus, a recent decision of the B.B.C. is a just one. Members of the staff who use their own cars on Corporation business will not qualify for travelling allowance unless the cars are fitted with interference suppressors. The cost of fitting suppressors will be borne by the Corporation, which already "suppresses" its own vehicles. It is recommended that a resistor of about 15,000 ohms should be inserted in each sparking plug circuit and one of about 5,000 ohms in the connection between the sparking coil and distributor head. Televiewers, particularly, will hope that this good example will be followed by other motorists.

Other parties intimately interested in this matter are the Marconi Companies. They, too, have had suppression devices fitted to all their vehicles and have offered to have suppressors fitted in the cars of members of their staffs.

* * *

It may be true, as Mr. R. H. Bent (Gloucester) says in a circular to power station superintendents, that these engineers are paid inadequately, but his proposals for the amelioration of their lot seems to me on the lavish side. He considers that power station superintendents should be termed "resident engineers" which, he says, they are in fact. They should be placed in Grade 1 of the N.J.B. Schedule and the steps in the higher classifications of the schedule re-arranged so that a resident engineer of a Class "O" station (over 450,000 kW) would receive not less than £2,500. I may say that at present station superintendents are placed in Grade 3 and for a Class "O" station the salary is considerably below half of that suggested by Mr. Bent.

* * *

A stage nearer a portable television receiver has been reached in America by the introduction of a semi-portable unit which can be easily carried around but requires an a.c. mains supply to operate it. A 3-in. direct view cathode-ray tube gives a $1\frac{3}{4}$-in. by $2\frac{3}{4}$-in. picture. The whole apparatus weighs only 15 lb and complete in cabinet measures only 14 in. by $9\frac{1}{2}$ in. by $13\frac{1}{4}$ in. A simple dipole aerial 2 ft in length is used and the controls cover tuning, brilliance, contrast and volume.

* * *

The Plymouth Fuel Economy Committee's scheme for organizing "fuel scouts" is admirable. According to a *Daily Mirror* report there will be no snooping: "the children will be encouraged to make only constructive criticism in their own and friends' homes." They will thus, no doubt, endear themselves to their parents and friends.—**REFLECTOR.**

I.E.S. in Yorkshire

Papers on Commercial Lighting and New Lamps

THE summer meeting last week at Harrogate Spa of the Illuminating Engineering Society, which is now composed of thirteen centres and six groups, set a precedent it is hoped for similar gatherings in alternate years in different parts of the country.

Members with their ladies and guests, numbering just over 300, under the presidency of Dr. J. W. T. Walsh (N.P.L.) included Mr. and Mrs. Ward Harrison and Mr. and Mrs. A. A. Brainerd from the United States while among delegates from France were Monsieur H. Maisonneuve, Monsieur, Mme. and Mlle. R. Lancelot, Monsieur and Mme. R. Nampon, Mlle. F. Dumas and Messieurs J. J. Chappat, J. Boski, M. Collot and H. L. Thesio. Holland was represented by Dr. Bergman.

On the Wednesday evening there was a reception by the Mayor (Councillor C. J. Simpson) and Mayoress of Harrogate with buffet refreshments and dancing. The technical session was officially opened next morning by the Mayor. In thanking him the president referred to the I.E.S. Silver Jubilee Convention of two years ago and said it was almost an innovation for the Society to meet outside London, but it was hoped to have summer meetings periodically at different centres in future.

The chairman, Mr. E. G. R. Taylor (Sheffield Centre), supported by Mr. H. C. Weston (hon. secretary), then called upon the authors to read the first two papers; the ladies meanwhile proceeded on a visit to York.

Acrylic Plastics for Lighting

Messrs. W. E. Harper and H. P. Walker (I.C.I., Ltd.) dealt with acrylic plastics for lighting fittings, mainly "Perspex" (polymerized methyl methacrylate) and "Diakon" moulding powder, largely of British development, "Lucite" and "Plexiglas" being the corresponding American products.

Their optical, thermal and mechanical properties were indicated. The methods of shaping and moulding when hot, the material then being in a rubber-like state, are so numerous that the authors could outline only some of the more important. Limited success has attended attempts to weld this substance by conventional means. Designers of fittings should therefore aim at the production of a complete component by a single moulding operation.

This material may help to reduce the corrosion, breakage and weight of street lighting lanterns. It may also satisfy BS.889 requirements for coal-face lighting fittings as well as those needed in inflammable industrial atmospheres. The collection of surface dust due to static electric charge and the risk of surface abrasion by wind-borne grit or by cleaning are two possible faults that can be minimized by care. The retention of static charge is due primarily to high surface resistivity; leakage can be assisted by applying a "wetting" agent in the form of paste.

The paper was illustrated with fittings of B.T.H., Crompton-Parkinson, G.E.C., Metrovick Revo and Thorn manufacture and experimental demonstrations.

The discussion was opened by Mr. J. G. Holmes who looked forward to developments in the use of this new material which he hoped would be employed in different ways from glass. They must try to get away from designs that had been limited by the properties of glass. A safe external temperature of 70 deg C meant 90 deg C internally which was not safe for deep fittings over a period of months. It was therefore advisable to limit the external temperature to 60 deg C. More data were needed about the heat-absorbing properties of the material. The opal varieties were the most significant advance in lighting materials.

Mr. T. S. Jones said that acrylic plastics had limitations as a substitute for glass, but they offered scope for fittings design in a way that was not possible with glass, as indicated by lantern slides he exhibited. The possibilities of the opal varieties were not fully appreciated. Anti-static treatment at periods of three months was quite sufficient.

Eleven other speakers asked for more information and in reply Mr. H. P. Walker said that additional data would soon be made available. At present they were still at an interim stage, but they must avoid designing lighting fittings in the glass tradition, although it was very difficult to make the new substance look like anything but glass.

Decorative Lighting

After a mid-morning break for coffee the second paper was presented by Mr. L. H. Hubble (B.T.H. Co.) who argued that decorative lighting was not so much a practice in itself as an essential feature of any lighting scheme. The word "decorative" implied ornament, whereas in illumination it might only mean simplification: indeed the modern tendency appeared to be towards the substitution of harmony for decoration.

The author contended that, with this approach, decorative lighting could be analysed in a way that was not possible if it were considered to be purely an artistic function. This aspect could thus be brought within the scope of many engineers who might otherwise feel unqualified to tackle the subject.

The approach to the decorative component must take the form of a search for harmony, first in relation to the prevailing human emotion of those for whom the lighting was designed and, secondly, in relation to the architectural character of the place to be illuminated.

The paper showed graphically how the addition of a decorative component might increase the functional effectiveness as well as the overall efficiency of a scheme. The author concluded with a detailed description of a hotel installation to illustrate how his ideas had been applied in practice.

Mr. W. R. Stevens opened the short discussion by saying that a lighting system should not make the place in which it was installed look worse than it was before. The author rightly believed that beauty was an essential part of life, so engineers should not be afraid of adding beauty to their installations. He agreed with the author that lighting could "suit" people and it should therefore be designed for them.

Mr. W. D. Sinclair asked by what means the lighting engineer could measure what was beautiful and assess what was not.

Three other speakers asked questions in reply to which Mr. L. H. Hubble explained that he had endeavoured to demonstrate "thought sequence," not good taste. He did not try to measure beauty; one should form an idea of how much damage could be done by installing unsuitable lighting in order to avoid doing so. There was little difference between the costs of doing things in good and bad taste.

Annual Meeting

The first business on the Thursday afternoon was the annual general meeting of the Society, Dr. J. W. T. Walsh presiding. The report of the Council and accounts for 1947, which had been circulated, were adopted with little comment. There had been a satisfactory growth of membership and expenditure had been kept 5 per cent below income, which again increased.

A superannuation scheme for the staff had been launched and would build itself up to a useful amount by the time it was needed. Machinery for conducting a "Register of Lighting Engineers," proposed a year ago, had been in full operation since 1st January, there now being 24 names on the register.

None of the bodies with which the late Mr. A. P. Trotter had been associated had taken any steps to commemorate his life and work. The I.E.S. had therefore instituted a Trotter Memorial Lecture fund and the current issue of *Light and Lighting* contained an appeal to members to associate themselves with this worthy memorial to such a pioneer.

After the business formalities delegates turned their attention to a lantern lecture by Mr. Ward Harrison on "Some Frontiers of the Lighting Art," the ladies meanwhile attending a mannequin parade arranged by Marshall & Snelgrove.

Mr. Ward Harrison is director of Engineering, Lamp Department at Nela Park, Cleveland, of the General Electric Co. of America. He devised long ago, in conjunction with Mr. Earl A. Anderson, the "coefficient of utilization" method which is now employed almost universally in design calculations for predicting illumination accurately. Recently he has devoted much of his time to an endeavour to establish a system of numerical glare ratings by the use of which it should become possible similarly to predetermine the quality of a lighting installation from the comfort standpoint; this was the theme of his address.

Mr. Harrison commenced by expressing the indebtedness of the United States to the United Kingdom for the development of fluorescent lamps. Tube makers in America had now adopted British "phosphors," inorganic luminous salts. Instead of trying to find new names for the foot-candle and similar terms, the I.E.S. might give more attention to brightness values as he would do in his address, which was divided into three parts.

The first was concerned with desirable levels of illumination. There was no conclusive guide, or any precise mathematical formula to employ. Decision had been by judgment, considered or not so well considered. The 40-ft-candle level now being demanded industrially in the United States was obtainable for the same cost as that of 4 ft-candles in 1914. To conserve human effort when doing work it was better to err on the side of generous illumination rather than insist upon minimum values for saving electricity.

The second part of the address discussed brightness distribution around the visual test (paper work in offices and schools) to indicate the discomfort caused by extraneous images in surrounding surfaces, even when the latter were not looked at directly. Seeing comfort could be much improved by reducing the environment brightness relative to that of the work area. Why bother about specular effects caused by reflected glare when they could be avoided by the reader tilting his book ? That question was an admission of the inadequacy (not meaning insufficiency) of the lighting scheme. Brightness of the ceiling, from which the light seemed to come, could be avoided by the installation of parallel rows of tubular lamps with curved louvres between the rows to direct the light sideways and prevent any of it coming down vertically.

The third aspect dealt with was ocular comfort when at rest, when the eyes were raised

from the work. How satisfactory a lighting system was must be judged by this criterion. Even indirect lighting could be objectionable if the expanse of ceiling was too large or the brightness too great. Inescapable consciousness of the fittings made the user think there was too much light. Louvred ceilings need not diminish the level of illumination on the working plane, but sources of low rather than maximum brightness were indicated.

All these glare-back studies had been undertaken with the object of establishing glare factor constants, especially at high values of illumination, in an attempt to reduce this aspect to a mathematical computation basis.

In proposing a vote of thanks Mr. W. J. Jones (E.L.M.A.) remarked that calculations by British engineers were based on methods devised in the United States by Mr. Ward Harrison, whose more recent work had now put them further in his debt. Both countries were striving to attach more importance to brightness than to foot-candles in the appraisal of glare of all kinds. Indirect illumination was not the beginning or end of good lighting. Mr. Harrison's graceful acknowledgment of the development of fluorescent lighting in Great Britain was appreciated; they were proud of the work done in lamp makers' laboratories in England.

Annual Dinner

The annual dinner at the Grand Hotel (convention headquarters) on the Thursday evening was followed by dancing and a cabaret. In proposing the toast of the I.E.S. Mr. Ward Harrison first brought greetings from the American sister Society which had a year ago welcomed Dr. Walsh to the Illuminating Convention in the United States. Both Societies must think of their opportunities, so he would make two prophecies. Two citadels remained in lighting progress. The first was that of the street authorities who, appalled at the accident rate, were now occupied with the making of wide stretches of concrete upon which, not two, but ten vehicles could collide with one another. It was gradually being borne upon them that, whether they had good lighting or not accidents must be paid for.

The second citadel was that of the architects, but that also had been breached for long tubes were now available that could be built into, not merely stuck on to, buildings. The architect's job for some time to come was not going to be new buildings, but remodelling, in which lighting would come into its own. The architectural profession was going to influence lighting for good more than any other factor, so engineers must act in the public interest and see to it that their conclusions were sound.

Dr. J. W. T. Walsh responded by reciprocating the cordial greetings received from the United States.

Mr. W. R. Stevens (London) proposed the toast of "The Guests" and in responding Monsieur Henri Maisonneuve extended greetings from the Association Française des Eclairagistes, of which he is a past-president, with the assurance that all was ready to welcome delegates to Paris for the International Commission on Illumination.

Departmental Store Lighting

The chairmanship for the last session on Friday was assumed by Mr. E. A. Fowler (Leeds Centre) when some factors that influence departmental store lighting were reviewed, with a stage display and exhibits, in a paper by Mr. Alan W. Jervis (consulting engineer to Debenham & Freebody). Mr. Jervis contended that lighting schemes must preserve the individuality of different stores and, at the same time, fit into the economics of store operation. Those were two determining factors. The total cost of lighting, heating and power in a store should not exceed 1 per cent of the total turnover and of that 1 per cent, lighting would represent from 50 to 75 per cent; the cost of electricity was reflected to the extent of more than a penny in the pound in the price of goods sold to the public.

Profit margins were under statutory control, so it was wrong to believe that stores could afford to pay high prices for electricity. Tariffs available to stores varied all over the country; they should be standardized. The best was a two-part tariff with the fixed charge based on rateable value or site area. The maximum demand and installed load systems tended to retard full lighting development.

Reliability of lamp life and performance was needed to permit regular renewal of lamps. Changing a lamp cost from 1s. to 20s. and, if done during business hours meant further loss through customer disturbance. Each store was striving to be different from, and ahead of, its competitors and for that reason alone mass-produced lighting design would fail. It had in the past been overlooked that long vistas reduced the angle of vision of lighting fittings almost to zero.

Fluorescent lamps would now permit entirely different treatment, but at the present price of these tubes there was no financial benefit in their use where electricity was cheap.

Pre-war levels were 5 to 8 lumens per sq ft on the upper floors and slightly more on the ground floor. To-day the figures were 15 to 20 generally and 25 to 30 for special features. Their maintenance would depend upon the future cost of electricity and possible increases of lamp efficiency because the level of illumination must be related to the overall cost of obtaining that amount of light. The sole object of an artificial lighting installation was to help sell the merchandise. If it failed to do that, then it was a waste of material and money.

With the increasing use of fluorescent lamps in the higher class of stores, colour troubles were

starting all over again; reactions were definite and growing while apparent colour seemed also to change with varying intensity, so that it was impracticable to expect a perfect standard.

In opening the discussion Mr. O. C. Waygood (Lewis's) said that neither the lighting nor the installation methods had been all that the stores needed. In opposition to the author, he considered that one standard system and a single type of fitting should be used throughout, of the five-pin plug-in kind and adaptable for either direct or indirect lighting. He would not design the lighting to suit the turnover, but would let the latter follow the former. The system must be flexible for quick modification when changes of display took place.

Five other speakers contributed and in reply Mr. A. W. Jervis said he was at variance with Mr. Waygood on points of detail, but not in general principle. Everything depended on the type and class of store.

Lamp Developments

After a mid-morning break for coffee Mr. N. L. Harris (G.E.C.) reviewed some of the newer lamp developments with the aid of striking stage demonstrations. He first referred to carbon-arc lamps for cinematography and stated that finality in the design of incandescent filament lamps had been nearly reached, since krypton gas was too expensive a substitute for argon for ordinary general purpose lamps.

In sharp contrast was the discharge lamp territory, which was by no means fully explored. The newer kinds of "phosphors" promised further improvements; the manner in which they produced fluorescent light under ultra-violet stimulation was complex and not yet fully understood. Control circuit variations for inducing quick starting were indicated.

The author then explained how the spectral distribution of light from mercury vapour lamps could be improved by the addition of other metal vapours (zinc and cadmium) and suggested that an efficiency of 75 lumens per watt might ultimately be achieved with an arc length of 1 cm which was very near the apparent upper limit.

If the vapour pressure could be increased sufficiently by operating the lamp at much higher temperature, then substantial improvement of colour resulted. This necessitated making the inner lamp envelope of quartz instead of glass and the use of a molybdenum foil multi-strip seal to carry 300 A continuously through the quartz wall. Experimental designs for up to 50 kW had been tried while 2·5- and 5-kW flood and spot lamps had been used in colour film and television studios without subjecting the actors to excessive radiated heat.

The paper ended with a brief reference to capacity-discharge successive flashing lamps (coiled tubes filled with krypton and xenon gas) for signalling, stroboscopes and press photography.

Dr. J. N. Aldington (Siemens) remarked that the author's broad survey should help users to select the most suitable sources for particular purposes. Wrong choice by the user would not help the lamp development engineer.

Lack of time prevented further discussion.

Mr. J. M. Waldram (president-elect) took the chair at the final Friday afternoon session when Mr. L. C. Jesty (Cinema-Television, Ltd.) lectured on television. He indicated that larger pictures for home reception and full-size cinema theatre pictures were now a possibility. The television camera could also provide the film producer with a monochrome picture for monitoring rehearsals, lighting, camera angles, etc., and high definition colour television might first be employed for this purpose.

The meeting ended with a tour of the Yorkshire Dales, with halts at South Stainley for tea and at Bolton Abbey for dinner.

A golf competition for the Dow Cup, presented by members of the North Midland Area of the I.E.S., was organized by Mr. A. Kelso, formerly borough electrical engineer of Harrogate.

Electricity Organization

SIR HENRY SELF, deputy-chairman of the British Electricity Authority, presented a paper on "The National and Area Organization of Electricity Supply" at the annual conference of the Institute of Municipal Treasurers and Accountants at Scarborough last week. In the first half he covered ground familiar to our readers in a survey of the development of the electricity supply industry up to the time of nationalization and the general reorganization effected by the 1947 Act. This led up to a consideration of the financial arrangements which had to be made in the taking-over of undertakings from municipal authorities. Such matters as superannuation, staff employed jointly by the electricity and other municipal departments and compensation to local authorities were also touched upon in this section.

Relationships with the consumer through the Consultative Councils and local committees; central control and decentralization; annual reports and accounts; and the training of staffs were other subjects covered by the paper. A valuable addition to the paper were "family tree" charts showing the organization of the Central Authority, Area Boards and Divisions.

Czechoslovak Duties Increased

Substantial increases in duties on imported electrical equipment have been put into force by the Czechoslovak Government. The classes affected include dynamos and motors, telegraph and telephone apparatus, measuring instruments, cooking and heating apparatus.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

That Poster

IN spite of the many comments that have been made concerning the B.E.A. poster—"Mummy Forgot to Switch it Off"—nobody seems to have noticed that the three-pin socket is upside down—that is, the earth pin is at the bottom.

This might not signify if it were a simple socket, but it is combined with a switch. As a result, with the socket empty the switch is shown as *on*, the knob being up.

More danger for the small boy on the chair!

Folkestone. T. C. GILBERT.

"Simmerstat" Control

YOUR reference to "Simmerstats" and multiple-heat switches for use with cooker hot-plates raises the question of the anticipated life of the "Simmerstat," bearing in mind the repeated on/off cycle when it is in operation. As manufacturers of this device we claim that the anticipated life will be from five to seven years. We have carried out life tests which more than substantiate this claim. A number of instruments have operated continuously for 1 to 1½ years when carrying a current of 17·5 A (the rated capacity being 12 A); this is equivalent to 60 years of normal use allowing half an hour's simmering per day.

Apart from the many thousands of "Simmerstats" which have been in service for a considerable time on domestic appliances we have supplied a large number for industrial use where the duty is much more onerous. Their reliability is reflected in the numbers returned to us which represent a fraction of one per cent, the majority of which relate to mishandling.

It is difficult to see why the on/off cycle should cause premature failing of the hot-plate. This failure is primarily a function of temperature and the temperature variation with "Simmerstat" control (even on radiant plates) is quite small, in fact it must be so, otherwise it would not do its job. What is more important, a low even temperature of the whole hot-plate is maintained, and this is essential for good results. With any multi-heat switch arrangement one element must be "full on" at certain positions and therefore remaining at its full temperature. Finally, of course, the "Simmerstat" makes possible the use of single-circuit plates with more robust elements and lower installation costs.

We, too, are convinced that nothing but infinitely variable control will provide the consumer with the service required. This control, coupled with compensation for ambient temperature change and voltage fluctuation, undoubtedly accounts for the outstanding popularity of the "Simmerstat."

SUNVIC CONTROLS, LTD.,
London, W.C.2. S. H. PARKER,
General Sales Manager.

Steam-Turbine Cycle

REGARDING the new steam-turbine cycle advocated by Mr. J. F. Field during the discussion on the I.M.E.A. gas turbine paper, I should like to raise the following queries:

(1) As combustion air will leave the super-heaters at about 1,500 deg F, how does Mr. Field propose to recover this waste heat? If by means of a combustion air preheater of special construction, what losses will be incurred in the process?

(2) In view of the relatively high compressor admission temperature and absence of intercooling, is not the negative to gross ratio entirely prohibitive with commercially attainable turbine and compressor efficiency ratios?

(3) In ordinary steam turbines reheating is considered hardly worth while with pressure ratios of 300 to 1, yet two-stage reheating is here advocated with a ratio of 10 to 1. In view of inevitable pressure drops, will such reheating have any appreciable effect in improving thermal efficiency?

(4) How does he propose to deal with compressor blade erosion and other troubles with very wet steam?

Preliminary calculations I have made with reasonable wetness fractions and with commercial efficiency ratios of 89 and 84 per cent for turbine and compressor respectively show overall thermal efficiency values well below ordinary steam-turbine practice.

Mr. Field would also appear to have made the mistake of assuming that working temperatures equal to those used with internal-combustion gas turbines will be practicable,

when actually for equal creep values internal combustion has an advantage of from 200 to 800 deg F depending on the adiabatic heat drop in the first turbine stage. This is due to there being no transmission of primary heat through pressure-stressed tubes as is the case with external-combustion gas or steam turbines.

The entropy diagrams of Mr. Field have little real significance and a Sankey diagram based on commercially attainable ratios for turbine and compressor would be illuminating.

Leeds. E. HALLOWELL.

Mr. Field has seen a copy of Mr. Hallowell's letter and replies as follows :—

MR. HALLOWELL'S letter gives me an opportunity of amplifying certain points which I had not time to do in my contribution to the discussion on the gas turbine paper read at Eastbourne by Mr. Bell and Dr. Smith. In appraising what I said then it is essential that one should admit the possibility of applying to superheated steam methods which have been applied to non-condensible gases in recent gas turbine practice. A full appreciation of the thermodynamic arrangements and the efficiencies that have been achieved in the various components making up present-day gas-turbine practice for both open and closed cycles is necessary in order to understand my proposals with regard to superheated steam.

As regards Mr. Hallowell's point (1), it is unlikely that combustion air would leave the superheaters at as high a temperature as 1,500 deg F. With proper contraflow arrangement of the heating surfaces the actual temperature should not exceed 1,200 to 1,300 deg F., but higher temperatures would not matter since regenerative air heating would be applied exactly as in high-pressure water-tube boiler technique. There is no difficulty about this: Ljungström type air preheaters have been applied in the United States in certain industries up to 1,500 deg F and, with suitable heat storage material, could go much higher. Mr. Hallowell should also note that the Escher Wyss closed-air-cycle machine uses a tubular air preheater working at similar temperatures. The "boiler" efficiency figures could certainly equal and conceivably exceed the figures obtained with to-day's best water tube boiler practice, by suitable research and development.

With reference to item (2), either a single or multi-stage centrifugal compressor or a multi-stage aerofoil type could be used. The admission temperature is that of the wet steam entering the compressor inlet, and since the aerofoil type of compressor is in effect an inverted steam turbine the low temperature of operation would make it exceedingly easy to build. The compressor could be made entirely of mild steel. The compressor-outlet temperature would be that of saturated steam at the higher operating pressure so that the outlet temperature need never exceed about 600 deg F. One of the outstanding advantages would be the complete avoidance of the intercooling which is a fundamental necessity for high efficiency when a non-condensible fluid such as air is used. The ideal negative process for a gas turbine would be the lowest possible temperature isothermal followed by an adiabatic, but you cannot do this with a non-condensible gas.

Intercooling cuts down the negative work and simultaneously raises the cycle efficiency in a gas turbine, but the injection of atomized water into an atmosphere of steam gives almost perfect isothermal compression with further saving in negative work. The machine has similar characteristics, including a similar order of negative work to a gas turbine working to a similar temperature and pressure ratio, but in practice there is no question that the negative work would be less than in a comparable gas turbine, because of the constant pressure character of the water injection process.

For the upper "gas turbine" part of the cycle the negative work might be a rather higher proportion of the gross work than in a gas turbine working with cold air, in spite of avoiding the need for intercoolers as already mentioned, but when the positive work of the lower part of the cycle with virtually no negative work (only a feed pump) is added the negative work for the machine as a whole should be substantially less than for a comparable gas turbine. That is why the thermal efficiency should be higher.

In connection with item (3), one could ask precisely the same question with reference to gas turbines. These were all originally developed for one stage of heating without a regenerator between the turbine exhaust and the air to the heater, and the difficulty was to get enough margin of output to be useful. This problem was solved by going to what were then fairly high upper temperatures and thereafter very great improvements were made to gas turbines by adding one reheating stage plus a regenerator. I would cite, for

example, the Beznau No. 1 machine recently installed in Switzerland by Brown Boveri. This has an all-over pressure ratio of about 9 to 1. A somewhat similar machine is under construction for the Trafford Park power station by Metropolitan-Vickers. Both these machines show very great improvement in thermal efficiency over a simple open cycle using the same initial temperature, and that which applies to gas must apply almost exactly to steam in the superheated condition.

The problem of pressure drop has apparently been quite successfully tackled in the only closed-cycle gas turbine so far tried out, and there is no question that suitable design of the heaters required for a steam cycle would result in a low enough pressure drop for the purpose. Tests on the original Escher Wyss machine indicated extremely low pressure drops through both regenerator and heater elements, and the same could apply to superheated steam.

As to Mr. Hallowell's point (4), it should be remembered that water is injected into the returning flow of superheated steam in a fine atomized condition and the infinitesimal particles of water suspended in the steam are whipped through the compressor and converted also to steam in a time interval estimated at micro-seconds, so that these small atomized particles of water cannot possibly coalesce into the bigger drops, impact on which is the known cause of l.p. blade erosion in a steam turbine. Mr. Hallowell may know that in the latter effect water separates out in large droplets, in fact there is a continuous flow of water to the outer ends of the fixed blading of the last two or three stages of a normal steam turbine, and the impact of the leading edges of the moving blades on this slow moving water causes the erosion normally experienced in the last two or three rows.

It is quite impossible for this to happen in the kind of compressor arrangement I have described. Even the first stage of compression in a multi-stage compressor of this type would reduce the wetness fraction substantially. The character of the losses which occur in aerofoils of this type is well known, and it is not beyond the bounds of possibility that a saturated vapour compression process applied in this way would benefit relative to a dry gas compression process in the manner in which these losses are absorbed in the working fluid. I am not quite sure about this point until I have investigated it further by actual experiment.

Mr. Hallowell's preliminary calculations, if made with a turbine admission temperature of say 950 deg F and with the efficiency figures he mentions would probably result in poorer performance than with ordinary steam turbine practice, and indeed attempts to get a useful output out of gas turbines at these temperatures in the early days showed very poor efficiencies compared with steam, but it has already been shown for several years to be a different story above 1,100 deg F for gas turbines and there is evidence that if superheated steam were used instead the relative advantage over the Rankine cycle would also improve as the temperature rose: at any rate all the leading gas turbine manufacturers say so about combustion gas and air, and they will find it difficult to refute the same argument as applied to the case of superheated steam.

With reference to Mr. Hallowell's last paragraph, the temperature-entropy diagrams were included to make the text clear to those who had specialized in the study of thermodynamics. In practice such diagrams differ considerably from theoretical perfection, and that theoretical perfection is merely a tool in the process of thinking about thermodynamic problems.

Generally with reference to Mr. Hallowell's last two paragraphs, I would refer him to what has been achieved already by the closed cycle air turbine of the Escher Wyss type. All I am doing at the top end of the cycle is to substitute superheated steam for air in a closed cycle. At the bottom end of the cycle my scheme has of course very great thermodynamic advantages over an air or gas cycle due to the constant pressure character of the condensible vapour process, and the fact that rejected heat is in the form of steam which can be controlled for condition over a wide range of pressure and superheat or wetness.

What is the alternative ? To burn coal as oil is burnt in an open-cycle gas turbine? The difficulties would be formidable. Alternatively we would continue as we are doing with the well-tried Rankine cycle, and if thermal efficiencies of 45 to 50 per cent sent out can be achieved with that cycle and with the metals we have available, I shall be grateful to have details of how it can be done, for fuel supplies rather than capacity of plant will be the limiting factor in our industrial development once the present shortage of plant is overtaken, as it will be. The third course is to accept the implied argument in

his letter that nothing can be done about it and that we must be satisfied with the present best steam-power thermal efficiency of some 32 per cent.

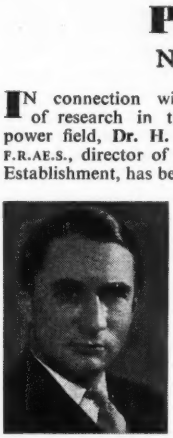
I cannot share that approach to this problem, and there must be many British engineers who feel as I do about it. The challenge is before us at this moment to improve all fuel-consuming processes and especially the power process, which is increasing in volume relative to the others, with the gigantic fuel savings and the profound economic benefits which necessarily follow. We should be unworthy of our responsibilities if we did not rise to the magnificent opportunity which the present economic conditions have set before us.

Edinburgh. J. F. FIELD.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN connection with general co-ordination of research in the nationalized fuel and power field, **Dr. H. Roxbee Cox,** M.I.MECH.E., F.R.AE.S., director of the National Gas Turbine Establishment, has been appointed chief scientist at the Ministry of Fuel and Power. **Sir Alfred Egerton,** F.R.S., Professor of Chemical Technology at the Imperial College of Science and Secretary of the Royal Society, has accepted an invitation to be chairman of the Scientific Advisory Council to be set up as a part-time body to advise the Minister of Fuel and Power on the scientific aspect of his statutory duties. One of Dr. Roxbee Cox's first tasks will be to make a survey of the research at present being conducted in the field of fuel and power by the industries themselves and by the Department of Scientific Research and to ascertain whether there is any ground which is not being covered. Dr. Roxbee Cox will also study and advise on general problems arising out of the application of existing scientific knowledge and the need to secure the best use of the country's fuel and power resources as a whole. The present Fuel Efficiency Branch of the Ministry of Fuel and Power will come under his supervision.



Dr. H. Roxbee Cox

Mr. H. D. B. Wood, O.B.E., an assistant secretary to the Board of Trade, has been appointed secretary to the South Western Electricity Board.

Mr. J. R. Shewan, electrical engineer, Scottish Region, British Railways, Edinburgh, has been appointed electrical engineer (London), Eastern Region.

Measurement, Ltd., announces that **Mr. J. McColl Christie,** Scottish representative with the company for the past eleven years has been appointed Northern Area sales manager; **Mr. R. Kullman,** M.B.E., has been appointed Southern Area sales manager; and **Mr. H. Horwood,** A.M.I.E.E., Southern Area representative since 1934 is now technical sales engineer to the company.

The Council of the Royal Society of Arts has appointed **Mr. Christian Barman,** F.R.I.B.A., a Royal Designer for Industry (R.D.I.) in recognition of his work for modern transport design. Mr. Barman's work in the field of industrial design has included domestic electrical equipment and lighting fittings.

Following upon the recently announced agreement between Thorn Electrical Industries, Ltd., of London and Sylvania Electric Products Inc. of New York providing for the interchange of technical information in the manufacture of electric lamps and lighting equipment, **Mr. Grenville R. Holden,** vice-president of Sylvania Electric, has been appointed to the board of Thorn Electrical Industries, Ltd.

Mr. B. H. Dyson has been appointed to the board of Hoover (Washing Machines), Ltd., Merthyr Tydfil, a subsidiary of Hoover, Ltd. Mr. Dyson, who joined Hoovers in 1937, is works manager at the Perivale cleaner factory and will continue in his present position. Mr. Dyson was apprenticed to Gresham & Craven and then spent five years in America where he gained considerable engineering and production experience. Upon his return he held positions in charge of production engineering departments in aircraft, scientific instrument, and electrical concerns. He is a fellow of the Institute of Industrial Administration, a member of the Council of the Institution of Production Engineers and a member of the Advisory Committee on Diecasting.

Mr. B. H. Dyson

Mr. J. T. Byrne, nominated for election as assistant general secretary of the Electrical Trades Union, with which he has been associated

since 1927. He was elected full-time secretary for the Clyde area in 1940 and promoted to area officer for West of Scotland two years later.

Mr. F. T. M. Kissel, B.SC. (ENG.), M.I.E.E., A.M.INST.C.E., recently retired on superannuation from the position of general manager of the New Zealand State Hydro-Electric Department. After graduating at Canterbury College, Mr. Kissel joined the N.Z. Public Works Department in 1905 and between 1911 and 1915 was in charge of the Coleridge Lake hydro-electric undertaking. He then spent a period overseas studying the latest hydro-electric practice and upon his return was appointed chief electrical engineer of the Department, becoming general manager of the Hydro-Electric Department upon its formation in 1945.

Mr. A. E. Davenport, B.E., M.I.E.E., who was chief electrical engineer, has been appointed to succeed Mr. Kissel and **Mr. S. Roberts,** formerly secretary of the Department, is the new assistant general manager.

Mr. I. W. D. Macdougall, D.S.C., secretary to Mavor & Coulson, Ltd., has been appointed a director. During the war he served in the Royal Navy.

Mr. H. Butterworth, the new managing director of the Edison Swan Electric Co., Ltd., recently made presentations to four employees who had been in the company's service for fifty

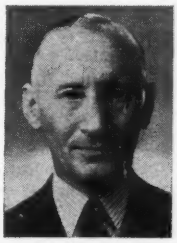
Mr. H. Butterworth presents a long-service award

years. Messrs. W. L. Walker, S. W. Brinton and Mr. C. H. Underdown each received a gold watch and Mr. J. Maskell a table model radio receiver. In the picture Mr. Butterworth is seen making the presentation to Mr. Underdown.

A coach outing to Brighton was much enjoyed by the staff of Alexr. Hawkins & Sons, Ltd., on 12th June. After lunch at the Savoy Café, the party dispersed to sample the numerous attractions of the town.

Mr. A. W. Page, for many years a director of H. & E. Lintott, Ltd., is now a director, with **Mr. S. W. Rowland,** of a newly-formed company, Rowland & Page, Ltd., Horsham.

Mr. Peter Rochs has been elected chairman of the Electric Vehicle Association of Great Britain for the ensuing year in succession to Mr. A. W. Barham. Mr. Rochs is general sales manager of Austin Crompton Parkinson Electric Vehicles, Ltd., and before joining the Crompton Parkinson organization in 1940 had been in the refrigeration industry as a director of George Barker & Co. (Leeds), Ltd., and as provincial sales manager to the Frigidaire Co., Ltd.



Mr. P. Rochs

Mr. A. R. Burr has been appointed area manager for Mullard Electronic Products, Ltd. (Valve Dept.), for the Midland Area.

At the annual meeting of the Southern Areas Electric Corporation, Ltd., Sir Arnold B. Gridley (chairman), announced that **Mr. H. Hobson,** M.INST.C.E., M.I.E.E., former chairman of the Central Electricity Board, had been appointed to the board of the company.

Mr. J. W. Simpson, O.B.E., informs us that the I.M.E.A. Convention Office in Kingsway is now closed and any communications regarding Convention matters, etc., should be sent to him at the British Electricity Authority office, 16, Stratford Place, London, W.1.

Obituary

Mr. R. A. Lower.—We regret to report the death, on 19th June, of Mr. Richard Anthony Lower, M.I.E.E. Mr. Lower was educated at Finsbury Technical College and served a pupilage with J. I. Thornycroft & Co. and the Great Eastern Railway. After a period as superintendent marine engineer at Greenock he went in 1910 to the Norwich Electricity Department and was sales superintendent until 1924 when he became assistant manager of the B.T.H. Co.'s Wiring Supplies Department. In 1934 he was appointed showroom superintendent by Central London Electricity, Ltd., and in 1938 became chief showroom superintendent, a position which he held until his death. Mr. Lower was sixty-four.

Mr. W. H. Duffett, British Electricity Authority senior executive officer for Rotherham and previously engineer and general manager of the Rotherham Corporation Electricity Department, died at Eastbourne on Saturday. He was taken ill while attending the I.M.E.A. conference there the previous Saturday. He was sixty-five and was to have retired later this year.

Will.—Mr. Charles P. Taylor, M.INST.C.E., chief engineer to Associated Portland Cement Manufacturers, left £14,616 gross (£14,475 net).

N.P.L. Activities

Inspection by the General Board

IN order to provide interested persons with an opportunity of becoming acquainted with the more recent activities of the National Physical Laboratory, under the directorship of Sir Charles Darwin, two days were assigned to the annual visit this week. The inspection by the General Board (chairman, Sir Robert Robinson, president of the Royal Society) took place on Tuesday morning, and members of university staffs and Government Departments were invited in the afternoon. The representatives of industrial organizations were afforded an opportunity of attending on Monday.

The work of the laboratory is conducted in ten divisions, each of which had arranged exhibits and demonstrations, the sum total being 272. In the Electricity Division experiments have been carried out and equipment constructed for extending the range of quartz-controlled oscillations to centimetric wavelengths. A number of stages of frequency multiplication, mixing and amplification are used to obtain sources of oscillation, of a power of about three watts, the frequencies of which are controlled by the primary standard. By using these oscillations and their harmonics up to the order of 36, controlled frequencies are obtained throughout the range of 350 Mc/s to 8,000 Mc/s at intervals of about 1 per cent. Two further stages are being added to extend the range to 50,000 Mc/s. A variable frequency oscillator, monitored by the standard, is used to interpolate between the controlled frequencies.

The most obvious use of this equipment is for the rapid and precise calibration of wavemeters, but an application of more fundamental importance may be the study of the radio frequency of atoms and molecules. The spectra of a number of gases have been examined during the past three years; the ammonia molecule, for example, is found to have lines in the region of 23,000 Mc/s and these frequencies have been measured to an accuracy of one part in a million. Such lines can be used as frequency standards.

Recording Transient Phenomena

The continuously evacuated, high-voltage oscillograph has so far been regarded as the only suitable instrument for recording non-recurrent transient phenomena of short duration, but the cost is prohibitive. It is shown in the high-voltage section of the Electricity Division that the sealed-off c.r.o. can give a comparable performance of both resolution and writing speeds, and it can be used for recording most transients without recourse to special photographic techniques. Measurements of the time variation of light from sparks are being made by means of a photo-multiplier, amplifier and cathode ray oscillograph, in order to provide a spark suitable for shadow photography in the Aerodynamics Division.

A differential analyser has been made in the Metrology Division to investigate the possibility of constructing for the Mathematics Division a full-scale machine employing mechanical integrators interconnected by electrical remote position control servo-mechanisms. Such a design, with centralized control, offers the advantage of flexibility and simplifies the process of setting up the equations to be solved. The accuracy, however, judged on the results of numerical tests, is not thought to be sufficiently high for the purpose required and consideration has been given to a fresh design of integrator.

Machine Safety Device

In the Engineering Division an electronic circuit is demonstrated, which will stop a machine should an increase of frictional force indicate that seizure of a bearing is imminent. The principle of operation is that of a resistance strain gauge circuit, which, when the strain reaches a predetermined value, causes an electronic trigger to operate, stopping the machine before serious damage occurs. This device is thought to be applicable to a wide range of machines, where imminence of an unsafe condition is accompanied by an increase of linear strain in one element of the machine.

Mercury and the liquid metals generally are interesting scientifically because of the low value of rate of transport of momentum compared with the rate of heat transport within them. Work on heat transfer in pipes using mercury as the working fluid was started in 1938 but had to be dropped; now, owing to recent developments, it has been restarted.

Apparatus for polishing metals electrolytically in the Metallurgy Division is modelled on that of Jacquet's where the specimen is immersed in a mixture of perchloric acid and acetic anhydride. The specimen to be polished forms the anode and the cathode consists of a sheet of stainless steel. At a suitable voltage the surface layer of the specimen is dissolved, leaving a mirror-like surface.

Among the many exhibits in the Radio Division is apparatus for the determination of the dielectric properties of water, which is needed for a full understanding of the propagation of centimetric waves. The reflection transmission co-efficients of water, from which its dielectric constant can be deduced, have been measured at wavelengths down to as short as six millimetres. Similar measurements on the effect of salt in solution have enabled a comparison to be made between the properties of sea water and pure water at high frequencies.

Electricity in the Highlands

Board's Fourth Report

THE North of Scotland Hydro-Electric Board's fourth annual report published this week contains particulars of the nine constructional schemes, comprising twelve projects with a total authorized capacity of 439,600 kW, which had been promoted by the end of 1947 and of the nineteen distribution schemes covering 4,000 sq miles with a population of 122,250, which had been submitted by the Board to the Electricity Commissioners.

Contracts were placed for 320 miles of 132-kV transmission lines for connecting generating stations of the North with one another and with the grid in Central Scotland.

Surveys for New Schemes

Field surveys of eight new schemes, whose total annual output approximates to 820 million kWh per annum, were completed during the year. These schemes include the following:—Glascarnoch-Luichart-Torr Achilty (Ross-shire), 60,000 kW; Glenmoriston (Inverness-shire), 56,000 kW; Glen Garry (Inverness-shire), 40,000 kW; Allt-na-Lairige (Argyll), 5,000 kW; Lawers (Perthshire), 30,000 kW; Loch Dubh, Ullapool (Ross-shire), 1,800 kW.

Contracts to the value of over £20 million had been placed, by the end of 1947, about 77 per cent of which will be incurred on site.

The number of workers directly employed in December was 4,039, since increased to 5,582. Camps to house 8,000 people, with amenities, have already been constructed. at a cost of over £1,000,000. Two hydro-electric schemes serving isolated districts in the Western Highlands, at Lochalsh, Ross-shire and Morar, Inverness-shire, will be in operation for the winter of 1948. A 15,000-kW gas turbine-alternator of the closed-cycle type, which will be manufactured at Clydebank by John Brown & Co., for Carolina Port generating station, Dundee, is expected to be ready for service in 1950.

Plant Manufacture

A new works in Clydeside for the manufacture of large hydro-electric plant is being built for the English Electric Co., by Harland & Wolff at Scotstoun, Glasgow. John Brown & Co., are making hydraulic machinery, the Harland Engineering Co., Ltd., Alloa, are manufacturing complete hydro-electric plant and many other Scottish firms are engaged on the production of pipe-lines, hydraulic valves and sluice gates, cranes, electric transformers, generators, switch-gear, cable-ways and transporters.

The Report refers to the wide range of equipment sold at exhibitions of domestic, industrial and agricultural electrical appliances, as providing a good indication of the intense interest taken in electrical apparatus by rural dwellers.

The Report (1s. 6d.), which is illustrated and contains maps of the schemes under construction, and the statement of accounts (4d.) can be obtained from the North of Scotland Hydro-Electric Board, 16, Rothesay Terrace, Edinburgh.

Perthshire Development

The Lawers Project (Constructional Scheme No. 18) just published is one of a group of schemes in Perthshire, which will produce 71 million kWh in a year of average rainfall. At present prices the capital cost is estimated at £2,850,000. Streams draining the slopes of Ben Lawers are to be led to a reservoir, an enlargement of Lochan na Lairige, on the high pass between Killin and Glen Lyon. The water will be collected at 1,720 to 1,850 ft above sea level and a gravity type dam 1,250 ft long by 130 ft high will be built about 470 yd from the outlet. The Lochan when raised to 1,715 ft above sea level will have a storage capacity of 2,900 million gal. giving a usable fall at Loch Tay of 1,362 ft. The impounded water will be taken by pressure tunnel and pipe-line to a generating station at the Killin end of Loch Tay in which a 30,000-kW Pelton turbo-alternator will be installed. This station will form one of a group of five remotely controlled from Killin.

Next Week's Events

Monday-Wednesday, 28th-30th June

LONDON.—Connaught Rooms, Great Queen Street, W.C.2. E.D.A.-E.A.W. Conference of Electrical Advisers and Senior Demonstrators.

Tuesday, 29th June

LONDON.—Institution of Electrical Engineers, 6 p.m. Electrical Association for Women. "The Application of Electricity to Home Economics in Sweden," by Mrs. E. A. Windsor.

HUDDERSFIELD.—2.15 p.m. Association of Mining Electrical and Mechanical Engineers, Yorkshire North-West Branch. Visit to Brook Motors factory.

Wednesday, 30th June

LONDON.—Institution of Civil Engineers, 2.30 p.m. Institute of Welding. Annual general meeting.

Friday, 2nd July

LIVERPOOL.—Liverpool Engineering Society, Dale Street, 6.30 p.m. Association of Supervising Electrical Engineers (Liverpool Branch). "The Slide Rule, Its Use and Application to the Electrical Engineer," by Mr. G. T. Richards, A.M.I.E.E.

YORK.—Royal Station Hotel, 7.30 p.m. A.S.E.E. (York Branch). Discussion "Members' Experiences."

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 11.30 a.m. Electrical Industries Benevolent Association. Annual general meeting.

Improved Street Lighting

MR. E. B. SAWYER, F.I.E.S., manager of the Lighting Service Bureau says that the announcement that electricity consumption for street lighting may be increased from 50 to 75 per cent of the pre-war figure will be acceptable because of the effect on public safety and morale.

The increase in electricity consumption will amount to only about 150 million kWh per annum or 0·3 per cent of the total sold for all purposes. As street lighting is very largely an off-peak load with a 50 per cent load factor for all-night lighting it will not have any appreciable effect upon the peaks.

In view of the difficulties under which the police have been working it is to be hoped that the major part of the permitted increase will be used to extend the areas lighted, especially in residential districts, and to extend the hours of use on those roads where lighting has been completely extinguished at or before midnight.

At first sight this may appear to involve a greater consumption than is permitted but three factors operate to make it possible. The street lighting engineer now has at his disposal sodium and mercury vapour lamps which are on the average 10 per cent more efficient than their pre-war counterparts; there will shortly be available additional sizes of blended-light lamps which can be substituted for filament lamps in existing lanterns (as no auxiliary apparatus is necessary) and are some 25 per cent more efficient than equivalent wattage tungsten-filament lamps; and fuel is saved by the conversion of gas or filament-lamp installations to sodium or mercury lighting.

Though it may not yet be feasible to restore the pre-war intensity of lighting or improve all installations to comply with modern requirements, the foregoing factors, coupled with the 50 per cent extra consumption now permitted, should enable the full number of street lighting points to be put back into commission, and partial all-night lighting to be restored.

Scientific Information

ON Monday last, Sir Robert Robinson, president of the Royal Society, opened a conference at the Royal Institution in London, under the joint chairmanship of Sir Alfred Egerton and Sir Edward Salisbury, to examine the possibility of improving present-day methods of collecting, indexing and distributing scientific information and the extension of existing abstracting services with a view to centralization. Representatives, numbering some 500 in all, of the appropriate authorities in the Dominions, India and the Colonies were present, together with observers from the United States. The interests of scientists as users received primary consideration and in order that delegates might familiarize themselves with the subject an exhibition was arranged at Burlington House where a representative selection of exhibits illustrated printing and other reproduction processes, classification methods, microfilm apparatus and examples of the variety of scientific publications. The conference was to continue until today (Friday) when the final form of recommendations will be approved before submission to the Council of the Royal Society.

Electricity Supply Statistics

THE Electricity Commission's Return of Engineering and Financial Statistics issued last week relates to authorized undertakings in Great Britain in 1944-45 (Stationery Office, 21s.). It follows the form of previous Returns in giving technical particulars for each undertaking in alphabetical order, of system of supply, generating plant installed, load factor, kWh generated and purchased, kWh sold to different classes of consumer, and number of consumers. Financial statistics similarly cover capital raised and expended, revenue from different classes of supply and other sources, revenue per kWh sold, subdivided working expenses, gross surplus and its appropriation for various purposes. A summary with tables of the principal features of the Return is also given. A further volume, for 1945-46, will be published shortly.

South African Electrical Trade

THE Department of Commerce and Industries of the Union of South Africa recently called attention to two new developments in electrical manufacture in Johannesburg. One combines the production of electrical appliances with that of builders' hardware in non-ferrous metals and the other covers a wide range of electrical switchgear and accessories. At present the latter concern undertakes to make 5-A, 250-V switches, 5-A, 3-pin plugs and sockets (flush and surface), 5-A, 3-pin plug and switch combinations (flush and surface), 15-A, 3-pin plugs and sockets, 15-A surface switch and plug combinations (plastic cover or ironclad) and 15-A and 30-A, double-pole and three-pole ironclad switches with fuses.

Imports of electrical goods into the Union more than doubled between 1945 and 1946. The totals of the principal groups in the two years are shown below. While imports increased greatly exports of cable and wire fell to £109,000 compared with £456,000.

Class	Imports 1945 £000	Imports 1946 £000
Batteries and parts	251	419
Dynamos and generators ..	108	227
Motors	305	488
Transformers	171	331
Cable and wire (rubber insulated)	58	383
Ditto (other)	167	604
Stoves and parts	65	150
Lamp bulbs	282	405

COMMERCE and INDUSTRY

Overseas Trade in May.

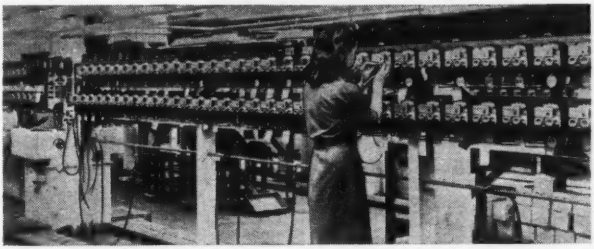
LAST month the total value of exports of electrical goods and apparatus from this country was £5,845,569, as compared with £3,736,221 in May, 1947, and a 1938 monthly average of £1,134,284. Corresponding figures for exports of electrical machinery (including vacuum cleaners and portable electrically operated appliances) were £2,679,366, £1,563,869 and £694,914. The grand total of electrical exports was thus £8,524,935, against £5,300,090 in May, 1947, and a monthly average of £1,829,198 in 1938. Details of the trade will appear in next week's issue.

Contract Price Adjustment Formulæ

The latest figures for use with the B.E.A.M.A. contract price adjustment formulae are as follows:—Rate of pay for adult male labour, 12th June, 110s. Board of Trade index figure for intermediate products, 12th June, 248·9 for the month of May.

New Meter Factory

A valuable addition to the present production drive has been made at Halifax, where Siemens house service meters are now being manufactured by their associated company, Alfred Graham & Co., Ltd. Though the site (previously known as Washer Lane Dye Works) was acquired as recently as 1945, the new works were designed, erected, completely equipped and actually in production before the end of 1946, despite the difficulties and material shortages existing during the entire period of reconstruction. A layout on the most modern lines and up-to-date methods of production enable output to be stepped up to meet the constantly increasing demands for house service meters both in this country and for export. The latest calibrating and testing equipment ensures the high degree of accuracy necessary for this class of product. The factory has been approved as an official testing station.



Testing and calibrating Siemens meters at the new Halifax works

E.D.A. Committees

The British Electrical Development Association has completed the appointment of members to the following committees:—General purposes and publicity; finance; joint E.D.A./E.R.A.; joint E.D.A./manufacturers; joint E.D.A./B.S.I. committee on electrical appliances and accessories; domestic installations and appliances; rural electrification (including representatives of farming and other rural interests); exhibition; Building Centre electrical section; street lighting; testing house; and electrification of collieries. The Association's representatives on the Electric Vehicle Committee have also been appointed.

Engineers' Wage Claim.

Contractors' Notes

Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, announces that the Association's annual general meeting will be held at Africa House, Kingsway, W.C.2, on 29th June.

Mr. Penwill warns E.C.A. members that the acquisition of iron and steel (in the form of conduit or otherwise) without proper authorization, or at more than the specified maximum price where this is prescribed, is illegal.

The agreement between the National Federated Electrical Association and the Electrical Trades Union provides that the 44-hour week shall operate over 5 or 5½ days at the sole discretion of the employer. Although this condition is considered essential, employers in deciding whether a 5 or 5½ day week is to be worked should have regard to all the circumstances, including the infliction of any unnecessary hardship upon their employees.

Contractors' attention is drawn to the Code of Practice relating to the abatement of radio interference and containing recommendations which Mr. Penwill considers to be worthy of study by his members.

S.E. Board's Magazine

We have already mentioned the "SeaBoard," the "house" magazine produced by the South Eastern Electricity Board. With the second number (June, 1948) three separate editions are being published for the Surrey; Kent; and Croydon, West and South-West Kent, Mid

and East Sussex areas to enable more attention to be given to the personal and social items in the particular area concerned.

Wages in the Engineering Industry

At last week's conference of the Amalgamated Engineering Union a resolution calling for immediate strike action to enforce the Union's claim for increased wages was rejected by 28 votes to 23. Instead the National Committee decided to call for a Government inquiry into the matter and to ask the unions affiliated to the Confederation of Shipbuilding and Engineering Unions to ballot on strike action if the findings of the court of inquiry are found to be unacceptable. A proposal to conduct a ballot of members of the A.E.U. at once was not adopted.

"Holding the Baby"

Many married women would respond to the call to return to the factories if they could make arrangements to have their small children looked after in their absence. This is realized

The B.T.H. Co. takes care of its women workers' children

by the British Thomson-Houston Co., which has just opened a day nursery at its lamp works. The premises are seen in the accompanying picture, which shows the Lady Mayoress of Leicester receiving a bouquet at the official opening ceremony.

Electronic Equipment Display

The current display in the British Thomson-Houston Co.'s window, Crown House, Aldwych, London, deals with industrial electronic equipment. This representative selection includes a thyratron voltage regulator, in which the rate of response is limited solely by the time constant of the machine controlled. The ignitron control equipment for resistance welding machines also shown has no moving parts or contacts in the power circuit, which ensures long trouble-free service with a minimum of attention. The electronic h.f. dielectric heater has been designed primarily for pre-heating moulding powders and preforms. The heater has an operating frequency of 27 megacycles per second and is capable of plasticizing 1 lb of normal moulding powder in a minute.

With thyratron motor speed control the speed of the motor can be regulated to within + or — 2 per cent. A speed range of 20 to 1 is obtained by armature control; with the addition of field control a range of 200 to 1 is possible. Industrial electronic timers have an accuracy of + or — 5 per cent throughout the timing range. Six different forms are made covering a timing range from 0·6 to 120 sec. Industrial photo-electric relays will respond to illumination on the photo-cell of 1 ft-candle for 0·1 sec.

Suggested Bonuses for Supply Workers

A resolution asking the executive of the Transport and General Workers Union and the East Midlands Electricity Joint Industrial Council to press for a scheme in all nationalized electricity undertakings to give bonuses to employees based on the efficiency of the undertakings, has been passed by Coventry electricity section of the Union. Their decision was taken after Mr. J. L. Jones, the Coventry district organizer of the Union told them that it was the obligation of the workers in the electricity undertaking to see that nationalization worked efficiently. He suggested that incentives should be offered.

Eastern Board's Headquarters

The Eastern Electricity Board's permanent headquarters are to be at Wherstead, Ipswich, on the south bank of the River Orwell opposite the new Cliff Quay power station. Owing to the need for certain repairs to the building it will be several months, however, before the transfer can be made, and in the meantime the headquarters will be at the central offices of the old East Anglian Company at Finborough near Stowmarket, Suffolk, to which the Board moved on 14th June.

Speedy Work by E.D.A.

The Essex Agricultural Show at Tilbury closed at 6 p.m. on 10th June, and the electrical exhibit arranged by the British Electrical Development Association had to be transferred to Hastings in preparation for the opening of the Sussex Agricultural Show on 16th June. The E.D.A. staff at the Essex Show worked from 6 to 10 p.m. on 10th June, packing the electrical installation which went off by road at 6 o'clock on the following morning, reaching Hastings at about mid-day, when the installation work for the Sussex Show was immediately put on hand.

The exhibits, weighing over 40 tons, were dismantled on 11th June, between 6 a.m. and 5 p.m., and were loaded on a special goods train with ten trucks at Tilbury Station. The train left Tilbury at 6.30 p.m., arriving at

Hastings at 5.30 a.m. on Saturday, and three hours later, the first container was on the showground. Everything was unpacked by 5 p.m. on Saturday, and the stand was ready for inspection a few hours ahead of scheduled time. The work was carried out under the supervision of Mr. R. Bayetto, one of the E.D.A. Area Officers, with the co-operation of British Railways officials.

Electricity for Rural Areas

A deputation from the Central Landowners' Association visited the British Electricity Authority on 16th June to press for the speeding up of electricity supplies for rural areas. A statement issued by the Association said that points made by the landowners' representatives included: Priority for farms and country areas, so that rural electrification could be expedited; the elimination of capital installation charges; and the reduction and standardization of farm tariffs. The Authority was unable to make any definite statement regarding completion of rural electrification, but assured the deputation that the countryside would have high priority. It also agreed to give "sympathetic consideration" to the problem of capital charges and farm tariffs.

Load Spreading at Dunlop's

After full discussion with their workpeople, production in Dunlop's rubber factories has been increased by spreading the electrical load more evenly over the twenty-four hours, Sir George Beharrell, Dunlop chairman, told shareholders at the annual general meeting. In some factories the special arrangements which had to be made involved considerable upheaval in the lives of the workers.

Export Credit Insurance

The new Export Guarantees Bill presented in the House of Commons last week by the President of the Board of Trade provides for an increase from £200 to £300 million in the maximum liability which may be incurred in insuring export trade. Up to the end of last March guarantees had been made up to a total of over £380 million and so far no loss has been incurred by the Export Trade Guarantee Department, the premiums having covered all claims made upon the Department.

Electrical Housecraft Advisers' Conference

About two hundred electrical housecraft advisers from all over the country are attending a conference and refresher course, which the British Electrical Development Association and the Electrical Association for Women are holding jointly from Monday to Wednesday next week at the Connaught Rooms, London. With Dame Caroline Haslett, D.B.E., in the chair, the opening session will be addressed by the Rt. Hon. Hugh Gaitskell, Minister of Fuel and Power, as well as by Mr. E. R. Wilkinson, commercial manager, British Electricity Authority, and Mr. C. F. Wells, chief commercial officer of the South Eastern Board, who are speaking on "Electricity and the Community" and "The Future of the Electrical Housecraft Adviser." Topics to be dealt with in the following sessions include new developments in electrical appliance design, the use of pressure cookers, large-scale catering, fluorescent lighting and frosted foods.

Increased Iron and Steel Prices

The Control of Iron and Steel (No. 64) Order (S.I. No. 1289) which came into operation on the 21st June, increases the maximum price of pig iron (other than common foundry iron) and finished steel. The purpose is to give effect to an offer by the British Iron and Steel Federation, in relation to the special appeal to industry in respect of prices made by the Chancellor of the Exchequer, to absorb part of the abnormally high freight cost on imported ore previously paid from public funds, a contribution amounting to about £2,250,000 a year. This arrangement itself involves no increases in the price of finished steel but only in basic and hematite pig iron, cylinder and refined iron, and semi-finished steel. At the same time minor increases are made on various other grounds in the maximum prices of certain products. After this offer by the industry to carry part of the freight subsidy has been brought into effect approximately £7 million in respect of current freight subsidiaries will still be borne by the Exchequer.

Initiation Training

The British Association for Commercial and Industrial Education (BACIE), 107, Baker Street, London, W.1, is organizing a one-day conference at the Goldsmiths' Hall, Foster Lane, Cheapside, E.C.2, on 2nd July, on the aims of "Initiation Training." The speakers will include Sir Charles Tennyson, C.M.G. (President of BACIE, chairman of the F.B.I. Education Committee, and secretary of the Dunlop Rubber Co., Ltd.), and Lord Forrester (managing director, Enfield Cable Works, Ltd.).

Lighting in the City of London

The *Illustrated London News* of 9th April, 1881, described the newest form of street lighting by carbon-arc lamps demonstrated by Siemens in the City of London. Again the newest form of street lighting is being demonstrated by Siemens in the City. In Moorgate, six "Wilton-Sieray 380" lanterns each of which houses three 80 W "Sieray MCF/U" warm-white fluorescent tubular lamps, have been installed. The lanterns are centrally mounted on existing span wires at 25 ft with spacings varying from 90 to 160 ft. Adequate light is provided on pavement and building faces; the road surface brightness is

high, although the light sources are not in any way glaring.

The lanterns were installed by the City of London Electric Lighting Co. and the Streets Committee of the City Corporation provided the opportunity of demonstrating the lighting. Both the Committee and the city engineer, Mr. F. J. Forty, are taking a keen interest in this experimental installation.

International Institute of Welding

Welding has just achieved organization on an international scale by the formation of the International Institute of Welding, at a recent meeting in Brussels, attended by the representatives of fourteen countries. Mr. G. Parsloe, the secretary of the British Institute, is the first secretary-general of the new body. It is intended that an annual meeting shall be held in future, and the Governing Council has accepted an invitation from the Netherlands to meet there in 1949. It has also accepted an invitation from the British delegation to hold the first World Welding Congress in Great Britain in the British festival year, 1951.

Shropshire Agricultural Show

In our notice in last week's issue of the exhibits of John Bromley & Co. (Wellington), Ltd., at the Shropshire and West Midland Great Agricultural Show, we stated that the show was held at Dewsbury. This should, of course, have read Shrewsbury.

Trade Announcements

All communications for the London Area sales office of Vactric, Ltd., should be addressed to 149, Regent Street, London, W.1 (telephone: Regent 5308).

The telephone numbers of the Electroplant Co., Palace of Engineering, Wembley, are now Wembley 6061-6066.

The St. Helens Cable & Rubber Co., Ltd., has moved its Manchester office and stores to larger premises at 37, Brunswick Street, Manchester, 13 (telephone: Ardwick 4223).

Trade Publications

G. M. Engineering (Acton), Ltd., Standard Road, North Acton, London, N.W.10.—Catalogue of oil circuit breakers.

Simmonds Aerocessories, Ltd., Treforest, Glamorgan.—Catalogue illustrating the applications of " Spire " nut, clips and fixing devices.

Metway Electrical Industries, Ltd., King Street, Brighton, Sussex.—Catalogue of industrial lighting fittings.

Yarrow & Co., Ltd., Scotstoun, Glasgow, W.4.—Brochure describing water tube boilers for use on land only.

Londex, Ltd., Anerley Works, Anerley Road, London, S.E.20.—Leaflet on a solenoid operated sight feed lubricator.

Westool, Ltd., St. Helen's Auckland, Bishop Auckland, Co. Durham.—Three leaflets on solenoids, muffles and general purpose coils.

Burgoyne Engineering Co., Ltd., 1, Robert Street, Hampstead Road, London, N.W.1.—Priced leaflet on the " 7 second " soldering gun.

Northern Electrics, Ltd., 104, Villa Road, Oldham.—Seven leaflets on fluorescent fittings and associated equipment.

Muirhead & Co., Ltd., Beckenham, Kent.—Technical leaflet describing transmission measuring set type D-514-A.

The Expanded Metal Co., Ltd., Burwood House, Caxton Street, London, S.W.1.—Catalogue of expanded metal resistances for industrial purposes.

British Celanese, Ltd., Celanese House, Hanover Square, London, W.1.—Two educational brochures—" Man-Made Fibres " and " Introduction to Plastics."

The Yale & Towne Manufacturing Co., Ltd., Wednesfield, Staffs.—Leaflet describing the " Wizard " 0·5 ton electric hoist.

Northern Industries, Snow Hill, Bradshaw Street, Manchester, 4.—Trade price list of wiring accessories, iron elements, bells, etc.

Johnson, Matthey & Co., Ltd., 73-83, Hatton Garden, London, E.C.1.—Brochure outlining the physical properties and uses of gold.

Brookhirst Switchgear, Ltd., Chester.—Brochure on the control and flow indication of material handling plants.

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from 16th June:—

AEROTRON. No. 647,815. Class 9. Electrical apparatus and instruments included in Class 9 and scientific apparatus and instruments.—F. W. Webb, 31, James Street, Chadderton, Lancs.

DALEX. No. 655,772. Class 9. Electrical apparatus and instruments included in Class 9; wireless apparatus; scientific apparatus and instruments, etc.—Gaskell & Chambers, Ltd., Dale End, Birmingham, 4.

B.G. (design) No. B652,605. Class 9. Electric bells, bell transformers, buzzers, switches, pear pushes, bell pushes, and plug and socket connectors.—British General Manufacturing Co. (1941), Ltd., 38, Glasshill Street, London, S.E.1.

MONITOR. No. 652,168. Class 11. Refrigerating and freezing apparatus, electric air circulating appliances, electric fans and incandescent lamp bulbs.—Monitor Equipment Corporation, New York. Address for service:—c/o A. M. & W. Clark, Quality House, 5-9, Quality Court, London, W.C.2.

FANFARE. No. 654,557. Electric fires (other than fires incorporating a fan).—Sigma Electrical Manufacturing Co., Ltd., Quadrant Works, Sheepcote Street, Birmingham, 15.

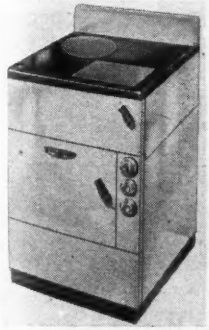
RECENT INTRODUCTIONS

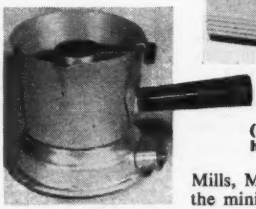
Notes on New Electrical and Allied Products

Streamlined Cooker

A COMPLETELY flush front and concealed oven door hinges giving a full 180 degree opening are features of a new streamlined cabinet cooker made by CLIFTON AIRCRAFT, LTD., Lytham, Lancs. A large hot-cupboard is made in one piece to give easy cleaning and rigid construction, two cams and quadrants permitting the door to carry considerable weight when open and yet to operate by finger-tip control without springs and hinge pins.

The hob equipment comprises one 8-in. boiling plate and a grill-boiler. The oven has 2,552 cu in. cooking space, the side and bottom elements (2,400 W) and guards being readily removable for cleaning the single-piece interior. A pilot light is incorporated in the thermostat knob. An exclusive harness wiring system greatly facilitates reconditioning. Using unskilled labour, all components, including the lagging, can be removed and reassembled within one hour without breaking any electrical connections, at the same time leaving all porcelain blocks for hot-plate, grill boiler and oven element contacts in position so that the whole assembled cooker body can be degreased as one unit. The cooker is finished in ivory or white with black hob and plinth.





"Clifton" cooker and (below) non-spill electric saucepan

Table Cooker

A table cooker introduced by the JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, London, S.W.1, is suitable for use on a 15-A a.c. circuit. Measuring 18 in. wide by 18¼ in. deep by 16 in. high, it has a good-sized oven with grill at the top and also bottom elements, both controlled by a thermostat. A radiant boiling ring fitted with a "Simmerstat" has a drip tray underneath, the whole hob equipment being easily removable. A plate-warming compartment is provided at the side of the oven. The finish is cream enamel with a dull chromium-plated top.

Catering Toaster-Griller

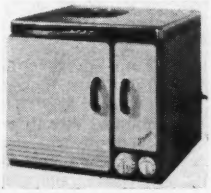
An improved de luxe model toaster and grill with ratings of from 2·66 to 6·66 kW suitable for use in catering establishments is an addition to the products of the ARORA CO., Rosebery Street, Loughborough. If necessary, three-heat control may be fitted to provide heating over particular portions of the cooking area.

Electric Saucepan

A one-pint electric saucepan made by ELECTRO TECHNICAL INDUSTRIES, LTD., 15, Islington Park Street, London, N.1, is especially suitable for boiling milk and making soup, sauces, etc. A lid is provided and a non-spill conical insert prevents boiling over. The element is loaded at 450 W.

Hair Dryer

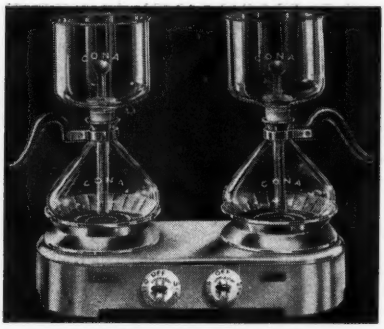
The novel design of the "Zephyr" hair dryer (ROCKMAN ENGINEERING CO., LTD., Woodstock Mills, Meek Street, Higginshaw, Oldham) gives the minimum resistance to the flow of air and by covering a wider area at once effects much speedier drying than the normal gun-shaped type. A rotary switch has warm, cold and off positions.



Jackson table cooker and (right) "Zephyr" hair dryer

Coffee-Making Apparatus

For use in catering establishments the CONA COFFEE MACHINE CO., LTD., 50, Park Street, London, W.1, has produced a coffee-making machine giving a minimum of 50 pints of coffee per hour, 4 pints per infusion. Its twin 500-W "Backer" hot-plates are controlled by "Simmerstats," while the use of all-glass coffee containers avoids the risk of contamination and spoiling



"Cona" electric coffee machine

of the flavour. The apparatus is also supplied as a component of "Conabar" equipment, comprising a milk urn, sugar and coffee canisters and two extra glass machines as emergency reserves.

Fluorescent Starter Switch

In order to provide replacements for the American canister type switches, ZODIAC ELECTRICAL PRODUCTS, Springfield Road, Guiseley, Leeds, are manufacturing miniature fluorescent starter switches. They are fitted with radio interference suppressors and are available in all standard ratings for use on 200/250-V.

Bedside Lamp

A nursery bedside lamp is announced by the BRITISH ASTRAL CO., LTD., The Chase, Bournemouth Park Road, Southend-on-Sea. The moulded case is a sphere mounted directly on to a hemispherical base. A translucent star, behind which is the bulb, is screwed into the side of the sphere and is readily removable for replacement of the bulb which is a standard 6·5-V 0·3-A miniature screw-cap type connected to a step-down transformer. A push-button switch in the base controls the primary circuit of the transformer.

British Astral "Slumberlight"

Motor Starting Capacitors

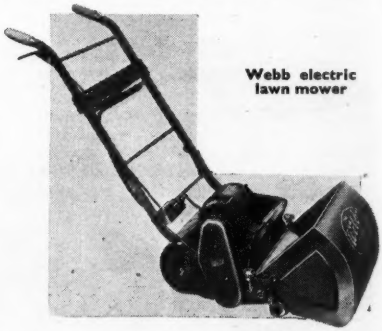
A range of electrolytic capacitors for a.c. motor starting and other applications where the applied voltage is intermittent is being manufactured by the DUBILIER CONDENSER CO., (1925), LTD., on its "Drilitic" principle. The element is sealed in a moulded container by a rubberized disc on which are mounted the two terminals; the latter in turn are enclosed by a moulded cap forming part of the container. The complete unit is mounted in a spring-clip bracket which enables it to be secured to the motor by means of two screws. Various sizes are available for from 150-350 V r.m.s. with minimum and maximum capacitances of 75 and 275 μF.

Storage Steam Raiser

To provide steam in situations where it is required at infrequent intervals and with the minimum electrical loading, the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has introduced a lagged storage type steam raiser. It is particularly suitable for dairy farms and with a 3-kW element will, it is claimed, give a performance for which a directly heated steam raiser of 20 kW or more would normally be required. Output may be raised and the recovery time reduced by two or three element loading to 6 kW or 9 kW. The maximum storage capacity is 80 lb, the rate of recovery for 3 kW and 9 kW loadings being 8 and 28 lb per hour respectively.

Lawn Mower

An electrically driven lawn mower now available to export buyers from H. C. WEBB & CO., LTD., Tame Road, Birmingham, 6, is



Webb electric lawn mower

fitted with a six-bladed 14-in. cutter driven at 750 r.p.m. by a ¼-h.p. motor. A fully automatic safety switch is provided.

Temperature Controllers

In an effort to overcome the difficulties encountered in the control of temperature, particularly in relation to thermoplastic moulding machines, P.A.M., LTD., Merrow, Guildford, Surrey, has devised the "Tem Con" valve-operated system. Basically the principle of operation is that of a small thermal switch working in conjunction with an amplifier, the output of which operates the relay controlling the heating elements. The sensitive element, or

switch, can be made extremely small and it is claimed that by using one which is 2 in. long by $\frac{3}{32}$ in. in diameter an accuracy of $\pm$ 0·2 deg C is possible. The controller unit is so constructed that its compact parts have valve-pin type bases which plug in to multi-hole sockets, thus minimizing maintenance difficulties.

Portable Test Equipment

The routine testing of portable machine tools and similar apparatus is simplified by two instruments available from AERONAUTICAL & GENERAL INSTRUMENTS, LTD., Purley Way, Croydon, Surrey. Initially, they were developed by Mr. F. C. Orchard, commercial officer, No. 1 "Chiltern" Sub-Area, Eastern Electricity Board, who sought to provide some means of minimizing the number of fatal accidents caused by neglected equipment.

"Orchard" fault location and routine test panels

Both instruments are simple to operate, indication for the majority of tests being given by signal lamps. Each set is connected to the mains through a 3-pin plug and lead and the various tests are effected by inserting the tool plug into the appropriate socket on the panel. The routine test panel facilitates earth continuity, insulation and running tests. A supplement to this instrument is provided by the fault location panel, which indicates open and short circuits in the tool cable together with a means of locating the position of the fault.

Miniature Ceramic Capacitors

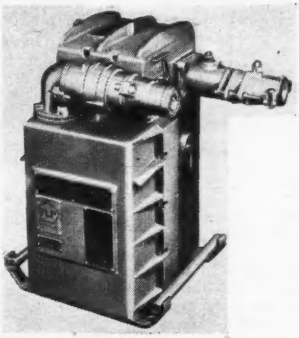
Three sizes of ceramic capacitors for incorporation in miniature equipment working at high frequency are now available from the UNITED INSULATOR CO., LTD., Oakcroft Road, Tolworth, Surbiton, Surrey. These "Hi-K" capacitors have a very low inductance which makes them suitable for television and frequency modulation receivers. The largest of the range is really a combination of three smaller units

U.I.C. miniature ceramic capacitors

and provides a capacitance of 1,000 pF from each of three connections to a common earth.

Lightweight Flameproof Equipment

In the construction of a lightweight flameproof panel for the control of shot-hole drilling machines in mines which has been developed by SIEMENS-SCHUCKERT (GT. BRITAIN), LTD., Brentford, Middlesex, cover bolts have been dispensed with entirely. Both main and isolating enclosures are incorporated, each with its covers secured by a simple wedge device, which is removed by the release of a single screw. This screw is shrouded and can be operated only by means of a special spanner, which would be held by an authorized person.



Flameproof boltless mine panel

Interlocking is arranged in such a way that the isolator cannot be closed until the flange gap, at every point, is below the specified limit—a condition which is not always met by bolted covers. Apart from fulfilling all the requirements necessary to conform to flameproof standards, maintenance costs are likely to be considerably reduced as the time occupied in

removing or replacing either cover can be counted in seconds as opposed to minutes with more conventional equipment.

Fluorescent Lighting Units

A 3-ft 30-W local lighting unit has been added to the range of "Atlas" industrial lighting equipment manufactured by THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1.

Rotary Change-over Switch

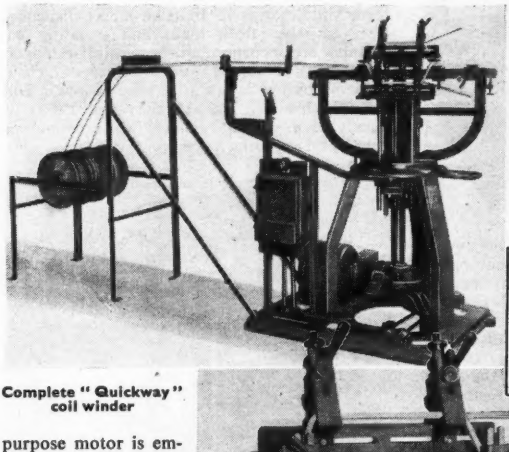
A switch for restricting domestic peak loads by reducing the simultaneous use of appliances which are rated at 2 kW or more is now in course of manufacture by QUINTON PRECISION PRODUCTS, LTD., 23, St. Paul's Square, Birmingham 3, to the design of Precision-Electric, Ltd. It is a four-position double-pole rotary change-over switch, the actuating principle of which is silver-faced spring loaded rods rolling over silver-plated contacts. Two ratings of this code "J" switch are available—20-A and 30-A.

Fused Plug Outlet

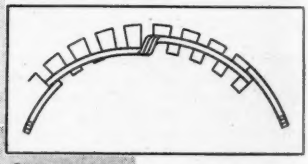
To comply with B.S. 1363, three-pin socket outlets and plugs of 13 A rating have been added to the range of accessories manufactured by A. P. LUNDBERG & SONS, LTD., 491-493, Liverpool Road, Holloway, London, N.7. The plug is square and in the cap is a single cartridge fuse. The socket is intended for flush mounting in a conduit box and up to three 7/·029 cables may be accommodated in the terminals.

Coil-winder Drive

AN improved way of driving the "Quick-way" machine for forming and winding coils is announced by the MIDLAND DYNAMO CO., LTD., Belgrave Gate, Leicester. A special purpose motor is employed, of the three-phase, two-speed type with a double wound squirrel cage rotor. It is designed to exert an unusually large starting torque and to withstand the strain of stubborn load, even when sustained, however ill-used by the operator. Low gearing and a foot-operated reversing contactor permit frequent starting to overcome the great strain which is intermittently, though repeatedly, exerted when winding multiples of rigid insulated conductors of large cross-section, such as are commonly pre-shaped for forming into heavy armature coils for traction motors. Coils of this kind are made with a double evolute in order to minimize breakdown risks by avoiding the need for the ugly crossing of the conductors trailing from the slot to the commutator. This hitherto relatively expensive and difficult form of winding is in demand because the looping of heavy conductors to effect a crossing in a coil must be done at the evolute in order to lessen insulation break-down between top and bottom windings. The evolute method of cross-over relieves excess chafing pressure, which is set up by the stress of changing centrifugal forces at varying armature speeds and by repeated stopping and reversing impacts of heavy load.



Complete "Quickway" coil winder



Armature coil evolute cross-over and (left) coil-forming head of winder

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Siemens Bros. & Co., Ltd. held their annual meeting recently at which Dr. H. R. Wright (chairman and managing director), presided. In his statement, which was issued with the report and accounts, Dr. Wright says that the order sheet for 1947 was substantially higher than for 1946. They have obtained a long lease of a modern building at West Hartlepool, giving an additional floor space there of 120,000 sq ft. The new instrument factory at Woolwich is now in full production. The demand for their telecommunications equipment is in excess of their present manufacturing facilities, but with the West Hartlepool factories entering into production the output will improve. By the latter part of the year export orders for their main telephone products rose to over 60 per cent of the whole. Further large orders for automatic trunk exchanges have been received; and the turnover of their marine radio and marine apparatus shows a considerable increase. But for the shortage of lead supplies in the earlier part of the year under review, their manufacturing facilities for power cables would have enabled them to obtain a much greater output. While the lead situation has greatly improved, they are even now only receiving enough lead to fill 75 per cent of their capacity. The value of orders from overseas shows an increase of nearly 70 per cent. Siemens Electric Lamps & Supplies, Ltd., has had another successful year. The new fluorescent lamp factory at Fylde Road, Preston, is now in operation. The research laboratories at the Dock Road, Preston, lamp works have devoted much effort to new developments, including the "Sieflash" high intensity flash tubes and the new gas arc. Submarine Cables, Ltd., owned jointly by themselves and the Telegraph Construction and Maintenance Co., Ltd., has had another busy year. A new type of submarine cable has been manufactured and laid during the year between Aldeburgh and Domberg, and another cable based on the same design is now being manufactured.

London Electric Co. Wire & Smiths, Ltd.—At the annual general meeting, Mr. W. J. Terry, chairman and managing director, stated that, while outstanding orders at the commencement of 1948 made a new record, there had been a distinct falling off in orders received since the latter part of the year. This might indicate a change-over from a seller's market to a buyer's market, but there must still be a large volume of requirements as yet unfulfilled, to be supplied when the necessary raw materials and facilities were available. Largely due to the restriction of principal raw materials, direct export sales were approximately 17 per cent lower than in the previous year. Recent changes in purchase tax, particularly as affecting the radio industry, had brought about cancellation of orders for materials, including the company's products, as well as unemployment.

T. Clarke & Co., Ltd.—Speaking at the annual meeting on 15th June the chairman (Sir Harold Moore) said that the balance standing to the credit of profit and loss account at the end of the year was £8,495, a slight increase on last year's figure; no credit had been taken for profit on any of the uncompleted contracts. The final dividend was again 5 per cent, free of tax, making a total of 10 per cent, free of tax. During the year they had co-opted three additional directors—Sir John Dalton, Dr. Hermann Korrodi (Zürich) and Mr. Peter Harman Jones. They were working to capacity and had a full order book and were undertaking work outside the United Kingdom.

The Southern Areas Electric Corporation, Ltd.—Speaking at the recent annual meeting, Sir Arnold B. Gridley (chairman) after referring to transfer of the electricity undertakings to the State, said that they proposed to take every opportunity to expand their existing manufacturing companies, to acquire others and to spread their investments. Mawdsley's, Ltd., was being offered more work than it could cope with, and the output in 1948 promised to be greatly in excess of 1947. Gillott Electric Steam Cookers, Ltd., was manufacturing a new type of cooker, immersion heater and other accessories; the New Day Electrical Accessories, Ltd., had made progress with prototypes of new accessories; and progress was being made by P.A.M., Ltd., and Mono-Can, Ltd. They had purchased a bakelite moulding business and formed a new company entitled Resinoid & Mica Products, Ltd., and had acquired a factory building in Birmingham for this business and that of the New Day Electrical Accessories. They had also formed Globelite Industries, Ltd., which had acquired concerns at Sydenham and Exeter. At Sydenham, dry batteries, radiators, dynamos, etc., were manufactured, while at Exeter there were works for the repair and reconditioning of electric motors and dynamos.

Babcock & Wilcox, Ltd.—The annual meeting was held recently. In his address, which was circulated with the report and accounts, Sir John Greenly (chairman) says that all departments were occupied to the maximum as far as labour, materials and controls would allow. Much progress has been made with the re-equipment and modernization schemes. The Research and Development Department continue to make good progress and since the end of the year under review, a well-equipped building has been acquired to house the whole

of this Department. The company has been able to maintain a substantial export trade and the position of the subsidiary companies remains satisfactory. The volume of orders on the books has increased materially since the end of the period under review.

W. T. Henley's Telegraph Works Co., Ltd.—Sir Montague Hughman, chairman, stated at the annual general meeting on 18th June that the company's business overseas last year reached record figures, showing over 26 per cent increase compared with 1946. Output in core miles for 1947 was higher at North Woolwich and Birtley than in 1946, but the output in tonnage was only slightly greater than in the previous year. At Gravesend, but for the restrictions upon the supply of raw materials, an output approaching that reached in their best pre-war years would have been achieved in spite of the enforced shut-down brought about by the fuel crisis.

Sterling Cable Co., Ltd.—Particulars of this company were published on Monday last for information only. The company was formed in February last to amalgamate a company of the same title, and its subsidiary, Lancashire Cables, Ltd. The first named company joined the Cossor group in 1939 and the second in 1942. Consideration for the transfer was the issue of £250,000 ordinary £1 shares and payment of £9,024 in cash. A. C. Cossor holds all but 7,370 of the shares. In addition £275,000 4½ per cent cumulative redeemable preference shares of £1 each have been subscribed at par by Hambros Bank. This yield of about £253,976 will provide additional working capital and replace temporary advances to the vendor companies from their bankers.

Associated British Engineering, Ltd., reports a net profit for the year ended 31st March last, after providing for taxation, of £80,816, as compared with £48,997 for 1946-47, which with £18,933 brought in makes £99,749 available. It is proposed to place £10,000 to dividend equalization account and £50,000 to general reserve. The ordinary dividend for the year is unchanged at 12 per cent, less tax, and £21,098 is carried forward. The report states that progress has been made for a financial merger between the Brush Co. and the subsidiaries. The accountants' recommendations have been received outlining a basis on which Brush should acquire from Associated British Engineering the shares in the two subsidiaries, for a substantial consideration in new Brush ordinary and preference capital. It is hoped to publish proposals shortly.

Walsall Conduits, Ltd., reports a trading balance for 1947 of £268,771, as compared with £260,492 for 1946, plus interest on Government securities (£3,331) and surplus on sale of investment (£4,671). After providing for depreciation, etc., there is a balance of £121,957 (against £119,164). Reserve again receives £20,000, and as already announced, the final ordinary distribution is 35 per cent, plus a bonus of 15 per cent, making 70 per cent (same) for the year. The balance carried forward is £184,041 (against £142,032 brought in).

Enfield Cables, Ltd., reports a net profit for 1947, after tax and depreciation, of £101,489, as compared with £54,354 for the preceding year, to which is added £4,408 brought in. The ordinary dividend for the year is maintained at 7½ per cent by the final payment of 3¾ per cent, reserve receives £50,000 and £14,647 is carried forward.

The Mirrlees Watson Co., Ltd., announces a net profit for 1947-48 of £36,489 (against £17,548). The ordinary dividend is again 8 per cent and the carry-forward is raised from £4,056 to £17,893.

The Dubilier Condenser Co. (1925), Ltd., reports a net profit for the year ended 31st March last of £74,951, as compared with £22,578 for the preceding year. General reserve receives £20,000 and dividend reserve £20,000. The ordinary dividend for the year is maintained at 20 per cent, and £53,671 is carried forward (against £32,687 brought in).

Peto Scott Electrical Instruments, Ltd., reports a net profit for the year ended 31st March last of £17,553, as compared with £34,286 for the preceding year. Taxation requires £12,258, and it is proposed to pay a dividend for the year of 12½ per cent, less tax (against 25 per cent), leaving £15,634 to be carried forward (against £13,433 brought in).

The Victoria Falls & Transvaal Power Co., Ltd., proposes to pay a final ordinary dividend of 15 per cent, maintaining the distribution for the year at 19½ per cent.

McMichael Radio, Ltd., reports a net profit for the past year of £35,102, as compared with £26,063 for the preceding year. The dividend for the year is unchanged at 8 per cent.

New Companies

Swaning Electrical Co., Ltd.—Registered 18th May. Capital, £500. Directors: R. E. J. Swan, R. King, M. M. Swan and J. E. King. Regd. office: 135, Hammersmith Grove, W.6.

Bott & Haynes, Ltd.—Registered 12th June. Capital, £10,000. Merchants, manufacturers and dealers in refrigerators, refrigeration plant, electrical and other engineers, etc. Directors: R. E. A. Bott (permanent chairman and managing director) and Patricia M. T. Bott and W. D. Haynes, all directors of R. E. A. Bott (Wigmore Street), Ltd. Regd. office: Winchester House, Old Broad Street, E.C.2.

C. J. Martin & Son (Croydon), Ltd.—Registered 11th June. Capital, £1,000. To acquire the business of electrical contractors, formerly carried on by C. J. Martin, H. Sansom, J. D. Martin and M. E. Martin as C. J. Martin & Son at 11, Hathaway Road, Croydon.

Directors: C. J. Martin (chairman) and H. Sansom, J. D. Martin and M. E. Martin. Secretary: M. E. Martin. Regd. office: 11, Hathaway Road, West Croydon, Surrey.

Clegg & Coupe, Ltd.—Registered 11th June. Capital, £5,000. Electrical engineers and general electrical installation contractors, etc. Directors: C. Clegg, Cecily Clegg and Eleanor Clegg. Regd. office: 69, Nolesworth Street, Rochdale.

Electronic Services (Westerham), Ltd.—Registered 11th June. Capital, £2,000. To acquire the business of electronic engineers carried on by G. A. Needham and C. L. Leach as Electronic Services at Westerham, Kent. Permanent directors: G. A. Needham and C. L. Leach. Regd. office: Kent Works, High Street, Westerham.

Garland Electrical Co., Ltd.—Registered 14th June. Capital, £500. Electrical and wireless engineers, etc. Permanent directors: H. E. Pearson, 17, Garland Crescent, Blackheath, Birmingham, and D. A. Peabody. Secretary: H. E. Pearson.

C. Lewis (Devon), Ltd.—Registered 14th June. Capital, £15,000. To acquire the business of a radio and electrical contractor carried on by C. C. Lewis as "C. Lewis" at 25, Torquay Road, Paignton (and branches). Directors: C. C. Lewis and Mrs. F. Lewis. Regd. office: 25, Torquay Road, Paignton, Devon.

Cranwell Electrical Installations, Ltd.—Registered 11th May. Capital, £100. Manufacturers of, and dealers in, electrical goods, equipment and apparatus, etc. Directors: Wm. R. Brown, A. W. Kimberley, C. E. Cranmer, H. G. Judd and E. F. le Poer Power. Regd. office: Thornycroft House, Smith Square, S.W.1.

Mid-Bucks Electrical Services, Ltd.—Registered 13th May. Capital, £5,000. Directors: L. E. Cogger, W. J. Hawkins and D. C. Arnold. Regd. office: 79-81, Tring Road, Aylesbury.

Increases of Capital

Kennedy's (Bournemouth), Ltd.—Increased by £100,000, in £1 ordinary shares, beyond the registered capital of £200,000.

Meeting of Creditors

Eastwood Electrical Co. (Keighley), Ltd.—A meeting of creditors was to be held on 18th June at the offices of Turner & Wall, solicitors, Arcade Chambers, North Street, Keighley.

Winding-up Order

Eralite Manufacturing Co., Ltd.—In the Companies' Court of the Chancery Division last week, Mr. Justice Wynn Parry made an order for the compulsory winding up of the company. Counsel had asked for a week's adjournment of the petition as a large creditor who was against the order now supported it. There were creditors for £50,000 in favour of the winding up. It was stated that the debenture holders had appointed a receiver.

Liquidations

Anderson Angell & Co., Ltd., electrical contractors, 22, Craven Road, London, W.2.—The first meetings of the creditors and shareholders under the compulsory liquidation were held on 16th June at Bankruptcy Buildings, Carey Street, London, W.C.2. A statement of affairs disclosed unsecured liabilities amounting to £14,882. The assets were estimated to realise £23,017, from which had to be deducted preferential claims of £5,746, leaving £17,271 to meet the claims of the debenture holders totalling £19,644. According to the receiver's statement which showed at 14th June, assets had been realized to the total of £14,120 and it was expected that the remaining assets would realize a further £9,150, which would be insufficient to meet the debenture and preferential claims. The failure was attributed to trading losses arising from wartime difficulties and lack of sufficient capital. No resolutions were passed and the matter was left in the hands of the Official Receiver.

Withy Trees Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Cumming, 7, Winckley Square, Preston, Lancs.

Incorporated Association of Electric Power Companies.—Meeting, 14th July, at 18, Austin Friars, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. J. Paterson.

Kee Radio & Electrical Equipment Co., Ltd.—Winding-up voluntarily. Liquidator: Mr. P. E. Barber, Easton Street, High Wycombe.

Antrim Electricity Distribution Co., Ltd.—Claims by 5th July to the joint liquidators, Messrs. W. J. Coad and S. H. Coombe, 88, Kingsway, London, W.C.2.

Mardens (Electric), Ltd.—Meeting, 27th July at 34, Great St. Helens, London, E.C.3, to receive an account of the winding-up by the liquidator, Mr. L. H. Findlay.

Bankruptcies

E. Marrow, electrical and radio engineer, carrying on business at 123, King Street, Knutsford, as "Marrows Radio Service." Claims to the trustee, Mr. F. C. Ormrod, Official Receiver, 20, Byrom Street, Manchester, by 29th June.

T. Bickerstaffe, electrical contractor, 131, Ribbleton Lane, Preston.—Receiving order made 16th June on debtor's own petition.

A. F. Howsley, electrical engineer, 25, Emesgate Lane, Silverdale, Lancs.—First meeting 29th June at the Official Receiver's Office, 20, Byrom Street, Manchester, 3. Public examination, 30th July at the Sessions Hall, Lancaster Road, Preston.

STOCKS AND SHARES

AT the present time Stock Exchange markets are subject to more than the usual number of cross-currents and perplexities. Politics—domestic and foreign—oppose that feeling of confidence which is necessary for markets in stocks and shares to maintain activity and cheerfulness. Company reports and accounts continue, on the whole, to exhibit satisfactory figures. In many of the statements which accompany the reports, however, the chairmen raise a word of warning as to the probable outcome of events during this year.

Evidence is provided from various directions of the fact that money is by no means as plentiful as it was, and that the spending power of the community is definitely lower. Costs, nevertheless, keep on a high level and the voluntary limitation of dividends on the part of so many companies deprives Stock Exchange markets of a factor making for hopefulness. Capital is shy of entering upon fresh enterprise at a time when private initiative is actively discouraged by the Government in power. During the last few weeks, the disposition of Stock Exchange prices in the industrial markets has been downward, though, on the other hand, "safety-first" stocks hold their ground. The two nationalization issues—Electricity 3 per cents at 100⅛ and Transport 3 per cents at 96⅞—are firm.

Telephone Exports

Siemens Bros. export orders for telephone apparatus had risen, by the end of last year, to 60 per cent of the total. This was disclosed by Dr. H. Wright at the annual meeting. Earlier, Sir Alexander Roger had given the same percentage as the expected proportion of the Automatic Telephone Company's overseas business this year. He emphasized the particular virtues of telephone apparatus for export business: the advantage lies in the small cost of materials in comparison with that of the man-power involved. At 64s., Automatic Telephone ordinary are in the increasingly select company of industrials yielding less than 4 per cent. Siemens, at 33s., pay just over 4½ per cent on the money.

Radio Shares

Depression persists in the market for radio and allied shares. Concessions by the Chancellor in the matter of purchase tax have been outweighed by consideration of trading difficulties as illustrated, in particular, by A.C. Cossor's preliminary figures, and by other reports. To these was added, last week, Peto-Scott's decision to halve the 50 per cent dividend paid for the last four years. Upon this, the 2s. shares fell from 4s. to 3s. 3d. At the annual meeting of Sydney S. Bird the chairman referred to a noticeable falling-off in the demand for radio components. The florin shares are quoted at 3s. 6d. McMichael introduced a brighter note with announcement of a material increase in net profits, and repetition of the 8 per cent dividend. The 5s. shares stand at 4s. Principal changes in prices this week are falls of 2s. 6d. in Decca Records, to 20s.; of 1s. 6d. to 8s. and 18s. 3d. respectively in Cossor and E.M.I.; and of ⅛, to 14s. 6d. in E.K. Cole.

Southern Areas

Nationalization of the electricity supply undertakings leaves Southern Areas Electric possessed of £829,000 British Electricity stock and about £350,000 represented by investments in, or advances to, the manufacturing members of the group. Issued capital is £783,500, all in ordinary shares. Sir Arnold Gridley has taken over the chairmanship, and Mr. Harold Hobson, former chairman of the Central Electricity Board, has joined the board. At the annual meeting Sir Arnold announced a policy of expanding the present manufacturing companies, and acquiring others. The company's £1 shares are practically the sole English survivor in the Stock Exchange official list of "electric light" shares. They are quoted at 22s. 6d., a price from which they have seldom deviated by more than 1s. since well before the last General Election. On the 5½ per cent dividend for 1947 they pay £4 17s. 9d. per cent on the money.

The Week's Price Changes

Victoria Falls ordinary shares at 7 11/16 are 5s. to the good and Thomas Tilling, after a rise to 103s., reacted to 101s. 3d., leaving a gain of 2s. 3d. on the week. British Insulated Callender's strengthened to 34s., Laurence, Scott to 13s. 6d. Falls are more numerous. Lancashire Dynamo at 5½ have lost 5s. Oriental Telephones at 50s. 6d., are 3s. 6d. down. Declines of 2s.6d. left General Electrics at 85s., General Cable at 37s. 6d., and Walsall Conduits at 56s. 6d. Electric Constructions at 48s. 9d. are ⅜ lower. Johnson & Phillips shed 2s. 6d. to 69s. Falls have occurred in Babcock & Wilcox, 67s. 3d., Switchgear & Cowans, 17s. 6d., E.K. Cole, 14s. 6d., Associated Electrical, 75s., De La Rue 43s. 9d., and Aron 55s.

Matters of Interest

Enfield Cables accounts show that, with net profits almost double last year's the 7½ per cent dividend is covered by earnings of over 20 per cent. Publicity is being given to the chairman's severe criticism, in the report, of the Government's bulk-buying policy. An issue of Sterling Cables 4½ per cent preference shares is expected before long. The Anglo-Argentine Tramway issues turned flat on the company's official denial that arrangements were on foot for the sale of the transport services. Dewhurst & Partner's interim of 10 per cent is in accordance with the recent propectus estimate, which forecast a total of 30 per cent for the year. The 2s. shares are quoted at 8s. 9d. British Electric Traction aroused interest by the company's entry into the film business.

Electricity in Mines

Planning New Colliery Installations

PROBLEMS arising in the planning of a new colliery formed the subject of a paper read on Wednesday last by Mr. George Mullin (area general manager, Fife and Clackmannan Area, National Coal Board) and Mr. L. R. Milligan (deputy area general manager, Fife Area, N.C.B.) at the annual convention of the Association of Mining Electrical and Mechanical Engineers at Edinburgh.

Attention was first drawn to the various essential information required to form the basis of the engineer's calculations—output, method of winding, layout, ventilation, geological data, type of coal preparation plant to be used and grading of the coal. The relative merits of cage and skip winding were discussed, together with the problem of the location of the motor-generator sets and the ventilating arrangements.

For the colliery in question, that at Rothes, an ultimate depth of 500 fathoms was planned, with a maximum output of 6,000 tons a day. It was expected that the normal surface and underground load without the winders would amount to approximately 4,000 kW at an average power factor of 0·6-0·7 lagging. With the No. 1 shaft winders operating at unity power factor, with automatic excitation control, the average colliery power factor would be raised to approximately 0·85.

A further improvement would be obtained from the No. 2 winder, the m.g. set driving motor of which was a duplicate of the No. 1 shaft machines but working at half load. It was proposed to operate this machine on constant excitation and to load it up with leading kVA to its maximum capacity, so that advantage of the spare capacity could be taken to bring the power factor up to an average of 0·9 lagging. Eventually there would be approximately 8,000 h.p. of synchronous plant available for power factor correction. Further correction would be done by static condensers situated as near as possible to the lower power factor plant in order to reduce voltage drop and distribution losses.

Selection and Care of Motors

The need for providing the best possible conditions for the motors and electrical gear was stressed by Mr. A. W. Duncan (chief technical engineer, Mining Engineering Co.), in a paper on "Belt Conveyors in the Mechanization of the Mining Industry." This meant, he said, the housing of the gear in a properly constructed engine house with lifting tackle and isolated from the dust and traffic inevitable in a main roadway. The use of centrifugal switches to guard against broken belts or excessive belt slip was mentioned and Mr. Duncan thought that considerable benefit could accrue from the general adoption of some type of spigot mounting for underground motors.

The first requirement of face and gate belts was a powerful starting torque and this was often the chief criterion affecting the choice of motor. There was seldom any condition of running at steady full load for a period long enough to be adjudged continuous rating by motor design standards. The standard (single-cage) squirrel-cage motor, whilst possessing a useful overload capacity, or pull-out torque, had an inadequate stalled torque, often less than full load. The starting current was, however, high and, depending on design, might be six to ten times full load current. Some improvements could be effected by increasing the resistance of the rotor conductors or by unbalancing the design to give the same effect as increase of line voltage. The high starting current was not objectionable, as such machines were generally connected to a power system which was carrying coal cutters or other machines of greater horse-power, which largely determined the capacity of the system.

The double squirrel-cage motor was capable of exerting twice full load torque when stalled. The pull-out torque was lower and not well defined and the starting current was moderate —about five times full load current. There was some increase in running losses, affecting the rating or frame size. Fan cooling was not generally desirable on or near the working face.

Owing to the diversity factor of the contributory loads the loading on a gathering belt or trunk conveyor tended to be steadier than on face and gate conveyors. The motor should be capable of running continuously at full load and fan cooling was desirable. A plain totally-enclosed motor, to be fully continuously rated, must be able to dissipate continuously from its outside surface the whole of its losses in the form of heat. Consequently the frame size was then determined by surface area and on larger powers it was obviously uneconomical to use large expensive frames merely for radiating effect. On long conveyors 160 per cent torque should be applied at starting, but 200 per cent should be available for abnormal conditions.

By using a traction type hydraulic coupling with a squirrel-cage motor it was possible to obtain all the advantages of simplicity whilst avoiding difficulties due to voltage drop. This applied particularly to those cases where the supply system was not considered adequate for the successful use of a direct-coupled high-torque motor. In the author's opinion the most important single factor in laying down the specification of a conveyor system was the accurate assessment of the real peak load.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Colonel Clarke asked the Minister of Fuel and Power, in connection with compensation regulations under the Electricity Act, which were the trade unions and other employee organizations with which he was negotiating with regard to the terms of the regulations; what was the state of the negotiations; and when it was likely that they would be concluded.

Mr. Gaitskell said his officials had discussed the basis on which these regulations should be drafted with the Employees' National Committee and other associations. Further consultations were pending and he could not yet say when they were likely to be concluded. The following was a list of the trade unions and associations concerned:—Organizations represented on the Employees' National Committee: Amalgamated Engineering Union, Associated Municipal Electrical Engineers, Clerical and Administrative Workers' Union, Electrical Power Engineers' Association, Electrical Trades Union, National Association of Local Government Officers, National Union of Enginemen, Firemen, Mechanics and Electrical Workers, National Union of General and Municipal Workers, and Transport and General Workers' Union. Other associations: Association of Officers and Staff Members of Electricity (Power and Supply) Companies of Great Britain and the Incorporated Association of Power Companies (in liquidation).

National Board Contacts

Mr. Henderson Stewart asked the Minister of Fuel and Power what steps he took to maintain contact with the operations of the National Coal Board and the Electricity Authority; whether regular consultations were held; and if individual members were free to consult him on matters of policy.

Mr. Gaitskell said that officials of his Department were in constant touch with officials of the National Coal Board and the British Electricity Authority, and he had made a practice of maintaining informal contact personally with the chairmen at frequent intervals. Consultations with the Board were held when occasion demanded. Individual members of a Board, other than the chairman, as representing the Board, would obviously not be "free to consult" him on matters of policy which were the responsibility of the Board as a whole.

Consultative Councils

Mr. Wilson Harris asked the Minister of Fuel and Power how many of the Consultative Councils contemplated under Section 7 of the Electricity Act, 1947 had been appointed by 1st June.

Mr. Gaitskell replied that none had been appointed.

Mr. Harris asked if it were not extremely unfortunate that two months after the vesting date, none of these Councils had been appointed. In view of the fact that the Councils were charged specifically with consideration of any variation of tariffs, could variations which had taken place without consultation be held to be in order.

Mr. Gaitskell replied that the difficulty was that he had to consult a very large number of different associations which had not yet sent in proposals for membership of these Councils. He could not proceed to the final selection until he had those particulars. In the meantime, the Electricity Boards were, in various cases, consulting the associations before they made changes.

Scottish Power Schemes

Replying to Mr. Gallacher Mr. Woodburn, Secretary of State for Scotland, said that at the end of May work was in progress on eleven hydro-electric projects prepared by the North of Scotland Hydro-Electric Board and 5,500 men were employed. The proposed installed generating capacity of these projects would be 436,800 kW. and the estimated annual average output 832½ million kWh.

He said that no further projects had been confirmed but six projects had been submitted to him by the Board for confirmation, on four of which, if confirmed, it was proposed to start work this year, and on the other two in 1949. In accordance with the Board's present programme, the amount of power available should be 175,000 kW by the winter of 1949-50, increasing—if the further projects now being considered were approved—to 570,000 kW by the winter of 1952-53.

Building Limit Raised

Mr. Key, Minister of Works, stated on Monday last that he had made an Order raising the limit upon unlicensed building and repair work from £10 to £100 in the twelve-month period starting on 1st July.

Restricting Non-Industrial Consumption

The problem of restricting the consumption of electricity by non-industrial consumers during the peak-load periods was to be examined at a conference at the Ministry of Fuel and Power yesterday. Officials of the Ministry, and representatives of chambers of commerce, banks, insurance companies, retail traders and catering and entertainment organizations had been invited to attend.

ELECTRICITY SUPPLY

Isle of Man Joint Authority. Development in Turkey.

Coventry.—DEFICIT DISCLOSED.—At a recent meeting of the Corporation Finance Committee the city treasurer reported that at the date of handing over the electricity undertaking to the British Electricity Authority (1st April) there was a deficiency of £182,124. In the preceding year there was a loss of over £70,000. Increases in prices were put into operation after the close of the financial year. The amount in the reserve fund when the undertaking was transferred was £66,238.

Debden.—STREET LIGHTING.—It is proposed that street lighting shall be provided by the Eastern Electricity Board at an estimated cost of £17,500.

Isle of Man.—PROPOSED JOINT AUTHORITY.—A committee comprising three members of the Douglas Electricity Committee and three representatives of the Isle of Man Electricity Board is investigating the possibility of setting up a joint generating authority.

Yorkshire. — OBJECTION TO TRANSMISSION TOWERS.—A plan for the British Electricity Authority to erect high-voltage tower lines across part of the proposed national park in the Peak District is being opposed by Sheffield Corporation and a number of other public bodies.

Overseas

Canada. — DEVELOPMENT IN NORTH-WEST TERRITORIES.—The Dominion Government is to introduce legislation establishing a power commission to develop electricity in the North-West Territories. The new commission's first duty will be to take over the hydro-electric development on the Snare River at Yellowknife which has been under way for two years and will be completed this autumn. The Bill will also give the commission powers to extend hydro-electric developments elsewhere.

Turkey.—STATE OF POWER INDUSTRY.—According to the Ministry of Economy of Turkey, new power stations and extensions to plants now under construction will raise the installed capacity from the present total of 27,375 kW to 106,450 kW in 1949. The amount of power generated last year was 620,000,000 kWh, an increase of 10 per cent on 1946. The leading projects due for completion before the end of 1949 are the Catalagzi steam plant (60,000 kW) and the extension of the Siliktar station at Istanbul (30,000 kW). The former will supply the Zonguldak and Karabuk areas. In reporting these developments *Foreign Commerce Weekly* (Washington) says that power consumption in Turkey is low, and demand in many parts of the country remains unsatisfied. Consumption per capita is about 30 kWh. Only about 10 per cent of the population has electric power facilities, which, speaking generally, are available only to inhabitants of large cities and villages, or near industrial areas. The cost of electricity is considered to be high. Turkey has tentative plans for large-scale development of the electric power industry, and especially of the country's hydro-electric resources, Most of these plans however have not been finally approved.

United States.—NEW DAM PROJECTED.—The United States Secretary of the Interior, Mr. J. A. Krug, has approved a plan for a dam costing $443,660,000 which will be the tallest and deepest in the world. It will be situated in the Hell's Canyon, Snake River along the Idaho-Oregon border, and will be 740 ft high, slightly more than the Hoover Dam, now the world's tallest, and will back up a reservoir 93 miles long.

Transport

Newcastle-on-Tyne.—NEW TROLLEY-BUSES.—The first of eighty trolley-bus bodies being made by Northern Coachbuilders, Ltd. for the City Council was recently handed over at a ceremony held at the company's works.

Generation in May

THE official returns of electricity generated appear for the first time in the Ministry of Fuel and Power's weekly press statement relating to coal output, consumption and stocks. In May 3,482 million kWh was generated in Great Britain (3,278 million kWh sent out), including 86 million kWh generated (85 million kWh sent out) from stations operated by the North of Scotland Hydro-Electric Board. These figures compare with the revised figures for May, 1947, of 3,092 million kWh generated and 2,915 million kWh sent out, and represent increases of 390 million kWh and 363 million kWh or 12·6 and 12·5 per cent respectively.

For the first five months of 1948 the total electricity generated was 19,953 million kWh (18,836 million kWh sent out), as compared with the revised figure of 18,815 million kWh (17,768 million kWh sent out) for the corresponding period of 1947, representing an increase of 1,138 million kWh (1,068 million kWh) or 6·1 per cent (6·0 per cent).

Coal consumed by electricity undertakings during the week ended 12th June amounted to 498,100 tons, compared with 408,000 tons during the week ended 7th June, 1947. Stocks distributed to electricity undertakings at 12th June totalled 3,648,900 (5·2 winter weeks' consumption), compared with 2,622,000 tons 3·7 winter weeks' consumption) at 7th June, 1947.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridges are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1942

A. L. CIANCHI.—"Automatically-released electric switches." 17160. 2nd December, 1942. (602865.)

1943

Dearborn Chemical Co.—"Methods of conditioning water for steam generation or for boiling." 15404. 22nd April, 1940. (602726.)

Standard Telephones & Cables, Ltd.—"Cathode-ray tube devices." 19415. 14th September, 1942. (602727.)

1944

B. J. Mayo and A. H. Atherton.—"Electron discharge devices employing hollow resonators." 215. 5th January, 1944. (602796.)

C. N. Barford.—"Electron-discharge devices of the velocity-modulation type." 3950. 2nd March, 1944. (602729.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation). —"Electrical type-printing telegraphic apparatus." 19789. 13th October, 1944. (602869.)

A. E. R. Arnot.—"Rotating electrical machinery." 20440. 21st October, 1944. (602870.)

1945

Scophony, Ltd., A. E. Adams and D. Walcfl.—"Dynamo-electric devices." 1054. 12th January, 1945. (602871.)

Farnsworth Television & Radio Corporation.—"Electron-optical devices." 2492. 27th January, 1944. (602872.)

English Electric Co., Ltd., E. H. Doughty and L. G. Wardle.—"Electrical measuring instruments." 4510. 22nd February, 1945. (602738.)

Compagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges et Carmargue.—"Electrolysis cell installation arranged for automatic adjustment of the position of the electrodes." 8764. 7th April, 1944. (602876.)

Soc. d'Application des Brevets Cotal.—"Electro-mechanical change-speed gear." 11157. 3rd November, 1943. (602803.)

Eureka Vacuum Cleaner Co.—"Suction cleaners." 13672. 10th February, 1944. (602745.)

Standard Telephones & Cables, Ltd. and W. R. Moscrip.—"Cathode-ray tubes." 15988. 22nd June, 1945. (602804.)

Servel, Inc.—"Refrigeration." 16323. 19th September, 1941. (602805.)

E. J. W. Watkinson.—"X-ray tubes." 18160. 16th July, 1945. (602750.)

G. H. Leland.—"Solenoid devices and apparatus comprising such solenoid devices." 18379. 26th June 1944. (602812.)

Soc. Anon. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey.—"Method of and means for transforming electrical energy into heat and light." 19802. 25th April, 1941. (602891.)

Walsall Conduits, Ltd. and E. Gough.—"Electric tumbler switches." 20423. 31st July, 1946. (602752.)

General Motors Corporation.—"Electric motor control system." 20530. 30th August, 1944. (602815.)

British Insulated Callender's Cables, Ltd. and G. T. W. Grieve.—"Plant and presses therefor for the extrusion of lead and lead alloys." 21738. 24th August, 1945. (602894.)

Plessey Co., Ltd., C. A. Pugh and A. H. J. Thomas.—"Reciprocating pumps and hydraulic motors." 23844. 15th September 1945. (602819.)

S. B. Harbour and B. Wand.—"Swivelling electrical connectors." 26169. 8th October, 1945. (602824.)

Standard Telephones & Cables, Ltd. and E. P. Rudkin.—"Volume expansion systems for audio and like amplifiers." 27858. 23rd October, 1945. (602768).

British Thomson-Houston Co., Ltd., L. Griffiths and G. E. Fardon.—"Electric lighting systems for vehicles." 29681. 7th November, 1945. (602773.)

Maschinenfabrik Oerlikon.—"Rotary drums for turbines and compressors." 29740. 20th December, 1944. (602656.)

Plessey Co., Ltd.—"Stator construction for rotary electric switches." 29777. 21st November, 1944. (602664.)

Soc. Anon. de Télécommunications.—"Apparatus for generating harmonic frequencies from an alternating-current supply." 29798. 6th August, 1942. (602669.)

Hoover, Ltd.—"Refrigeration." 29947. 13th November, 1944. (602691.)

G. R. Shepherd (Westinghouse Electric International Co.).—"Electric conversion systems." 29961. 9th November, 1945. (602692.)

G. R. Shepherd (Westinghouse Electric International Co.).—"Electric current conversion systems." 29962. 9th November, 1945. (602693.)

W. T. Henley's Telegraph Works Co., Ltd. and E. Moor.—"Electric distribution apparatus." 29974. 9th November, 1945. (602695.)

Standard Telephones & Cables, Ltd. and A. M. Searle.—"Electric dry rectifiers." 29995/6. (602699/700.)

L. Fuller and E. W. Sudlow.—"Electric secondary batteries." 30024. 9th November, 1945. (602704.)

A. V. Gilbert.—"Gas turbines." 30041. 9th November, 1945. (602706.)

Plessey Co., Ltd., C. Crampton, C. S. Wright, J. O. G. Barrett and J. E. Rhys-Jones.—"Cathode-ray direction-finders." 30122. 12th November, 1945. (602717.)

English Electric Co., Ltd. and P. L. Mardis.—"Pneumatically operated reversing switches." 30196. 12th November, 1945. (602941.)

British Thomson-Houston Co., Ltd. and L. Griffiths.—"Impulse starters for magneto-electric machines." 30204. 12th November, 1945. (602942.)

W. Jones & Co. (Engineers), Ltd. and E. G. Hills.—"Electrical circuit impulsing mechanisms." 30226. 12th November 1945. (602945.)

Veritys, Ltd. and J. W. Forth.—"Fluorescent electric lighting fittings." 30260. 13th November, 1945. (602951.)

British Thomson-Houston Co., Ltd.—"Electrical induction apparatus." 30282. 15th November, 1944. (602956.)

Metropolitan-Vickers Electrical Co., Ltd., J. D. Craggs, J. M. Meek and C. J. Braudo.—"Spectrographic light sources." 30338. 13th November, 1945. (Addition to 588844). (602959.)

Waymouth Gauges & Instruments, Ltd., and H. Waymouth.—"Apparatus for the measurement of electrical reactance." 30339. 13th November, 1945. (602960.)

A.C. Cossor, Ltd. and H. Moss.—"Cathode-ray tubes." 30343. 13th November, 1945. (602961.)

Compagnie pour la Fabrication des Competeurs et Matériel d'Usines à Gaz.—"Combined electric differential protection and metering systems." 30356. 21st January, 1944. (602962.)

Maschinenfabrik Oerlikon.—"Gas blast circuit-breakers having disconnection resistances." 30373. 20th November, 1944. (602966.)

G. F. Weeks.—"Electro-magnetic make-and-break devices." 30381. 13th November, 1945. (602967.)

T. J. McDermott and E. Coop.—"Multi-channel signalling systems." 30384. 13th November, 1945. (602969.)

Standard Telephones & Cables, Ltd. and R. F. Cleaver.—"Rotary electric potential dividers." 30460. 14th November, 1945. (602979.)

J. R. Tillman.—"Variable reactance electron-discharge tube circuit arrangements." 30476. 14th November, 1945. (602982.)

V. J. Beddow.—"Electrical connecting sockets." 30556. 15th November, 1945. (602989.)

E. V. Golder and D. B. Fletcher.—"Piezo-electric crystals having wire connections." 32489. 30th November, 1945. (602781.)

J. Tym.—"Electrically-heated domestic irons." 32685. 3rd December, 1945. (602844.)

Westinghouse Electric International Co.—"Electric motor control systems." 32930. 5th December 1944. (602783.)

Marconi's Wireless Telegraph Co., Ltd. C. P. Cooper and G. E. Williamson-Noble.—"Voice or like signal operated switching circuit arrangements." 34333. 18th December, 1945. (602789.)

Standard Telephones & Cables, Ltd.—"Multi-channel electric pulse communicating systems." 34766. 7th April, 1944. (602849.)

1946

Standard Telephones & Cables, Ltd., F. H. Bray, L. J. Brooks, G. C. Hartley and L. P. Lowry.—"Station identification in electric communication systems." 4141. 11th February, 1946. (602927.)

Standard Telephones & Cables, Ltd., F. H. Bray, L. J. Brooks, G. C. Hartley and L. P. Lowry.—"Station identification in telecommunication systems." 4632. 14th February, 1946. (602928.)

General Electric Co., Ltd. and S. H. Noble.—"Circuits for electric discharge lamps." 11868. 17th April, 1946. (602858.)

1947

British Thomson-Houston Co., Ltd.—"Waste disposal apparatus for attachment to a sink." 1144. 12th January, 1946). (Addition to 594329.) (602862.)

British Insulated Callender's Cables, Ltd. and G. T. W. Grieve.—"Lead melting pots and other vessels for containing molten metal." 26575. 24th August, 1945. (Divided out of 602894.) (602933.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aberdeen.—Corporation. Electrical fittings for six months, schedules from City Engineer's Office.

Angus.—28th June. County Council. Electrical work, Arbroath High School. Specification from James McGregor, County Buildings, Forfar.

Ayr.—County Council. Lamps. Forms from the county clerk, Supplies Department, County Buildings.

Argentina.—BUENOS AIRES.—30th July. Department of Water and Electric Power. Supply and erection of turbo-alternators, pressure pipe line, etc., at the Agua Negra Dam, Province of La Rioja.

National Oilfields Department.—14th July. Deep-well pumps. 15th July. Magnetometers. 28th October. Department of Military Manufactures (*Dirección General de Fabricaciones Militares*, Av. Cabildo 65, Buenos Aires). Factory for the manufacture of electrical conductors, including the supply of machines, installations and spares; and the layout and erection of the machinery and auxiliary services.

Australia.—SYDNEY.—21st July. N.S.W. Railways. 20,000-kVA synchronous condensers and control equipment for Carlingford terminal station. Particulars from the chief electrical engineer.

Belfast.—6th August. Electricity Department. Electrically-driven drainage pumps and pipework for harbour power-station. (See this issue.)

Dundee.—17th July. Corporation Public Lighting Department. Tower wagon. Forms from public lighting engineer, 1, Lochee Road.

Egypt.—Ministry of Public Works. The closing date for tenders for the erection of the 25,000-kW power station at Talkha has been extended to 29th September next.*

Manchester.—30th June. Town Council. Inter-communication telephone system at the City Magistrates' Court, Minshull Street. Particulars from the city architect, Town Hall.

Newcastle-on-Tyne.—City Council. Electrical installations in 64 houses in Dewley Road. Plans by the city architect, 18, Cloth Market.

Sunray lamps and other electrical equipment for remedial treatment at Northumberland Baths for the City Council.

Poole.—6th July. Borough Engineer's Department. Electric storage water heaters, house control units and street lighting lanterns. (See this issue.)

South Africa. — JOHANNESBURG. — Railways and Harbours. 29th July. Electrically heated horizontal box type furnace suitable for carburizing and general heat treatment of steel.*

PRETORIA. — 24th August. City Council. 33-kV and lower voltage auxiliary transformers. (18th June.)

CAPE TOWN.—28th July. City Electricity Department. Cables and jointing material for a working pressure of 12 kV and cables for a working pressure of 660 V. (Ref. 36898/48).*

Uruguay. — MONTEVIDEO. — Usinas Electricas y Telefonos del Estado.

29th July. 108,500 porcelain insulators. (Ref. 37230/48).*

18th August. 1,000,000 metres of vulcanized twin conductor. (Ref. 36968/48).*

20th July. 1,000 telephone subscribers' individual protection boxes and spares. (Ref. 36967/48).*

22nd July. 300 sets of extension telephone instruments and spares. (Ref. 36969/48).*

26th July. Uncovered copper wire conductors. (Ref. E.P.D. 37232/48).*

20th July. Direcciòn General de Communicaciones. Supply of 40 complete sets of equipment for telephone operators, and spare parts. (Ref. 36965/48).*

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

British Electricity Authority.—During the past month contracts have been placed for generating station, switching and transforming station and transmission equipment amounting in value to £2,575,505. The principal contracts include:—Power transformers, Bankside generating station (Ferranti, Ltd.); foundations and building works for extension of boiler house and turbine house, Stourport generating station (Sir Robert McAlpine & Sons (London), Ltd.); civil engineering and building work (generating station, switch house, coal handling plant and foundations to transformer park), Brunswick Wharf (Poplar) generating station (Peter Lind & Co., Ltd.); and civil engineering and building work (foundations, superstructure, circulating water system, sidings, etc) Peterborough generating station (Mitchell Construction Co., Ltd.).

Plymouth.—Town Council. Accepted. Electrical installations at South Crownhill and West Efford primary schools (£2,790).—Southcombe & Willcocks.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bilston.—Permanent dwellings (68), Stow Lawn Estate and Ward Street, Ettingshall; borough architect, 20, Wellington Road.

Birkenhead.—Primary School, Bedford Drive, Rock Ferry; Willink & Dod, architects, Cunard Building, Liverpool.

Bishop Auckland.—Houses (50) and 18 bungalows; surveyor, U.D.C. offices.

Bolton.—Shops, Breightmet Hall and Lever Edge Lane; Bolton Co-operative Society, Ltd., Bow Street.

Bootle.—Houses (150), Copy Lane, Netherton, for T.C.; Netherton Building & Construction Co., Ltd., builders, Church Road, Litherland.

Bury.—Boys' and girls' secondary schools, Radcliffe Road; borough engineer, Municipal Offices, 28, Bank Street.

Canterbury.—Four workshop blocks at the Technical College, Barton Court; L. H. Wilson, city architect, Municipal Buildings.

Cheshunt.—Permanent houses (44), Bury Green Estate; Clifford Tee & Gale, architects to U.D.C.; 153, Moorgate, London, E.C.2.

Chester-le-Street.—Electrical installation for 80 houses for R.D.C.; F. Bowman, Estate Office, Great North Road, Birtley.

Chorley.—Houses (40), Thornhill Estate; borough surveyor, Council Offices.

Dunstable.—Dwellings (32), Beecroft estate; borough surveyor, Municipal Offices.

Dumbarton.—School, Renton; county architect, 18, Park Circus, Glasgow.

Ealing.—R.C. primary school, Woodfield Road; D. Stokes, architect, 5, Cochrane Street, London, N.W.8.

Edinburgh.—Buildings, including cinema; A. Fairley & Son, Ltd., restaurateurs, 85, Leith Street.

Farnborough.—Research laboratories, Ravensbourne, Westerham Road; Tate & Lyle, Ltd., 52, Cadogan Square, London, S.W.1.

Hampton Wick.—Factory, rear of St. John's Road; F. Barber, architect, 10, Milner Road, Kingston-on-Thames.

Hendon.—Shops with maisonettes above, Salcombe Gardens, Wentworth Hall Estate, and 60 flats, The Fairways Estate; A. O. Knight, borough engineer, Town Hall, N.W.4.

Hounslow.—Alterations, etc., to West Middlesex County Hospital (£19,460), for C.C.; William Lacey (Hounslow), Ltd., builders.

Hull.—Offices and warehouse for Clayton Jackson & Co., 46, Little Humber Street; W. H. Taylor & Son, architects, George Street.

Ipswich.—Junior school, Whitton White estate; Johns & Slater, architects, 8, Lower Brook Street.

Kendal.—Grammar school; R. H. Crompton, county architect, Kendal.

Leeds.—Headquarters for Wool Industries Research Association, Torridon; P. T. Runton & Co., architects, District Bank Chambers, Bradford.

Fire station, junction of Stanningley Road and Cockshoot Lane; R. H. A. Livett, city architect, Priestley House.

London.—CLAPHAM.—Flats (148), Clapham Park, for L.C.C.; S. T. Howard, staff architect.

PADDINGTON.—Four blocks of flats, Peach Street, for B.C.; Holloway Bros. (London), Ltd., Bridge Wharf, Millbank, S.W.1.

Lowestoft.—Workshops, offices and stores, Battery Green Road, for the Boston Deep Sea Fishing & Ice Co.; Ernest C. Allerton, architect, 43a, London Road South.

Maidstone.—Houses (34), Allington Estate; Cox Bros., builders, 27, Mote Road.

Market Harborough.—Market hall and bus station, old brewery site, Northampton Road; U.D.C. surveyor.

Maryport.—County primary school; J. H. Haughan, county architect, 4, Alfred Street North, Carlisle.

Newcastle-on-Tyne.—Extensions to Nurses' Training School at the Fleming Memorial Hospital; Cackett, Burns Dick & McKellar, 21, Ellison Place.

Staff rooms, cloak rooms, canteen, etc., for Bainbridge & Co., Bigg Market; Cackett, Burns Dick & McKellar, 21.

Willesden.—Rebuilding Wykeham Schools (£51,760), for E.C.; Drury Lowe & Co.(London), Ltd., Queen's Walk, Ruislip.

ELECTRICAL REVIEW

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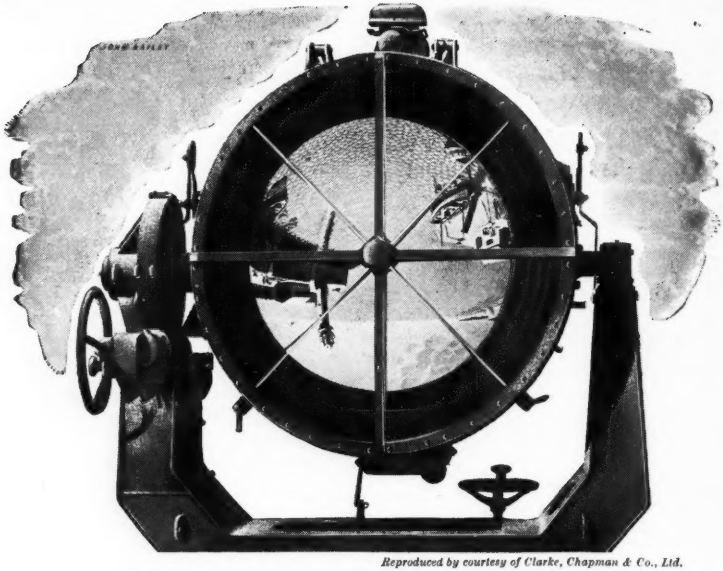

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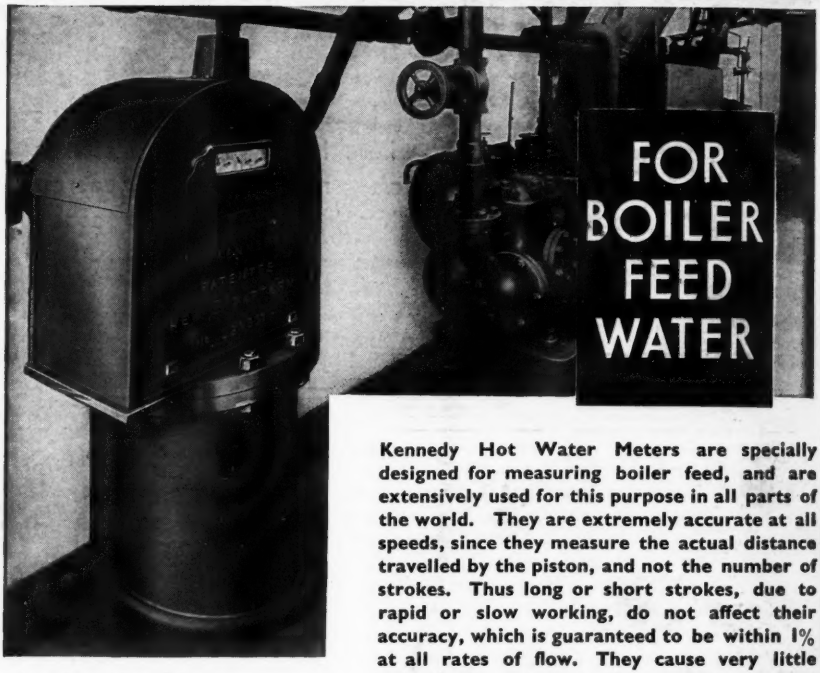

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